The SGRUD Thesis

SGRUD is Growing Rapidly Until Distinction.

Philip Schildkamp

Abstract

Abstract.

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Appendix

bin Module

`@sgrud/bin` - The SGRUD CLI.

```
Description
  @sgrud/bin - The SGRUD CLI

Usage
  $ sgrud <command> [options]

Available Commands
  construct    Builds a SGRUD-based project using `microbundle`
  kickstart    Kickstarts a SGRUD-based project using `simple-git`
  postbuild    Replicates exported package metadata for SGRUD-based projects
  runtimify    Creates ESM or UMD bundles for ES6 modules using `microbundle`
  universal    Runs SGRUD in universal (SSR) mode using `puppeteer`

For more info, run any command with the `--help` flag
  $ sgrud construct --help
  $ sgrud kickstart --help

Options
  -v, --version    Displays current version
  -h, --help       Displays this message
```

Source

packages/bin/index.ts:1

bin.**construct** *(Function)*

constructs a SGRUD-based project using microbundle.

```
Description
  Constructs a SGRUD-based project using `microbundle`

Usage
  $ sgrud construct [...modules] [options]

Options
  --compress    Compress/minify build output  (default true)
  --format      Build specified formats  (default commonjs,modern,umd)
  --prefix      Use an alternative working directory  (default ./)
  -h, --help    Displays this message

Examples
  $ sgrud construct # Run with default options
  $ sgrud construct ./project/module # Build ./project/module
  $ sgrud construct ./module --format umd # Build ./module as umd
```

Example

Run with default options:

```
require('@sgrud/bin');

sgrud.bin.construct();
```

Example

construct `./project/module`:

```
require('@sgrud/bin');

sgrud.bin.construct({
  modules: ['./project/module']
});
```

Example

construct `./module` as `umd`:

```
require('@sgrud/bin');

sgrud.bin.construct({
  modules: ['./module'],
  format: 'umd'
});
```

Signature

```
construct(options?): Promise<void>
```

Returns

An execution Promise.

Parameters

Name	Type	Default value	Description
`options`	`Object`	`{}`	The `options` object.
`options.compress?`	`boolean`	`true`	Compress/minify **construct** output.
`options.format?`	`string`	`commonjs,modern,umd`	**construct** specified formats.
`options.modules?`	`string[]`	`undefined`	Modules to **construct**.
`options.prefix?`	`string`	`./`	Use an alternative working directory.

Source

packages/bin/src/construct.ts:73

bin.**kickstart** *(Function)*

kickstarts a SGRUD-based project using simple-git.

```
Description
  Kickstarts a SGRUD-based project using `simple-git`

Usage
  $ sgrud kickstart [library] [options]

Options
  --prefix      Use an alternative working directory  (default ./)
  -h, --help    Displays this message

Examples
  $ sgrud kickstart # Run with default options
  $ sgrud kickstart preact --prefix ./module # Kickstart preact in ./module
```

Example

Run with default options:

```
require('@sgrud/bin');

sgrud.bin.kickstart();
```

Example

kickstart `preact` in `./module`:

```
require('@sgrud/bin');

sgrud.bin.kickstart({
  prefix: './module',
  library: 'preact'
});
```

Signature

```
kickstart(options?): Promise<void>
```

Returns

An execution Promise.

Parameters

Name	Type	Default value	Description
`options`	`Object`	`{}`	The `options` object.
`options.library?`	`string`	`sgrud`	Library which to base upon.
`options.prefix?`	`string`	`./`	Use an alternative working directory.

Source

packages/bin/src/kickstart.ts:55

bin.**postbuild** *(Function)*

Replicates exported package metadata for SGRUD-based projects.

```
Description
  Replicates exported package metadata for SGRUD-based projects

Usage
  $ sgrud postbuild [...modules] [options]

Options
  --prefix      Use an alternative working directory  (default ./)
  -h, --help    Displays this message

Examples
  $ sgrud postbuild # Run with default options
  $ sgrud postbuild ./project/module # Postbuild ./project/module
  $ sgrud postbuild --prefix ./module # Run in ./module
```

Example

Run with default options:

```
require('@sgrud/bin');

sgrud.bin.postbuild();
```

Example

postbuild `./project/module`:

```
require('@sgrud/bin');

sgrud.bin.postbuild({
  modules: ['./project/module']
});
```

Example

Run in `./module`:

```
require('@sgrud/bin');

sgrud.bin.postbuild({
  prefix: './module'
});
```

Signature

```
postbuild(options?): Promise<void>
```

Returns

An execution Promise.

Parameters

Name	Type	Default value	Description
`options`	`Object`	`{}`	The `options` object.
`options.modules?`	`string[]`	`undefined`	Modules to **postbuild**.
`options.prefix?`	`string`	`./`	Use an alternative working directory.

`Source`

packages/bin/src/postbuild.ts:67

bin.**runtimify** *(Function)*

Creates ESM or UMD bundles for node modules using microbundle.

```
Description
  Creates ESM or UMD bundles for node modules using `microbundle`

Usage
  $ sgrud runtimify [...modules] [options]

Options
  --format      Runtimify bundle format (umd or esm)  (default umd)
  --output      Output file in module root  (default runtimify.[format].js)
  --prefix      Use an alternative working directory  (default ./)
  -h, --help    Displays this message

Examples
  $ sgrud runtimify # Run with default options
  $ sgrud runtimify @microsoft/fast # Runtimify `@microsoft/fast`
```

`Example`

Run with default options (not recommended):

```
require('@sgrud/bin');

sgrud.bin.runtimify();
```

`Example`

runtimify `@microsoft/fast`:

```
require('@sgrud/bin');

sgrud.bin.runtimify({
  modules: ['@microsoft/fast']
});
```

`Signature`

```
runtimify(options?): Promise<void>
```

`Returns`

An execution Promise.

`Parameters`

Name	Type	Default value	Description
`options`	`Object`	`{}`	The `options` object.
`options.format?`	`string`	`umd`	**runtimify** bundle format (umd or esm).
`options.modules?`	`string[]`	`undefined`	Modules to **runtimify**.
`options.output?`	`string`	`runtimify.[format].js`	Output file in module root.
`options.prefix?`	`string`	`./`	Use an alternative working directory.

Source

packages/bin/src/runtimify.ts:60

bin.**universal** *(Function)*

Runs SGRUD in **universal** (SSR) mode using puppeteer.

```
Description
  Runs SGRUD in universal (SSR) mode using `puppeteer`

Usage
  $ sgrud universal [entry] [options]

Options
  --chrome      Chrome executable path  (default /usr/bin/chromium-browser)
  --prefix      Use an alternative working directory  (default ./)
  -H, --host    Host/IP to bind to  (default 127.0.0.1)
  -p, --port    Port to bind to  (default 4000)
  -h, --help    Displays this message

Examples
  $ sgrud universal # Run with default options
  $ sgrud universal --host 0.0.0.0 # Listen on all IPs
  $ sgrud universal -H 192.168.0.10 -p 4040 # Listen on 192.168.0.10:4040
```

Example

Run with default options:

```
require('@sgrud/bin');

sgrud.bin.universal();
```

Example

Listen on all IPs:

```
require('@sgrud/bin');

sgrud.bin.universal({
  host: '0.0.0.0'
});
```

Example

Listen on `192.168.0.10:4040`:

```
require('@sgrud/bin');

sgrud.bin.universal({
  host: '192.168.0.10',
  port: '4040'
});
```

Signature

```
universal(options?): Promise<void>
```

Returns

An execution Promise.

Parameters

Name	Type	Default value	Description
`options`	`Object`	`{}`	The `options` object.
`options.chrome?`	`string`	`/usr/bin/chromium-browser`	Chrome executable path.
`options.entry?`	`string`	`index.html`	HTML document (relative to `prefix`).
`options.host?`	`string`	`127.0.0.1`	Host/IP to bind to.
`options.port?`	`string`	`4000`	Port to bind to.

Name	Type	Default value	Description
`options.prefix?`	`string`	`./`	Use an alternative working directory.

`Source`

packages/bin/src/universal.ts:74

bus Module

`@sgrud/bus` - The SGRUD Software Bus.

The functions and classes found within the **`@sgrud/bus`** module are intended to ease the internal and external real-time communication of applications building upon the SGRUD client libraries. By establishing a Bus between different modules of an application or between the core of an application and plugins extending it, or even between different applications, loose coupling and data transferral can be achieved.

The **`@sgrud/bus`** module includes a standalone JavaScript bundle which is used to Spawn a background Thread upon import of this module. This background Thread is henceforth used as central hub for data exchange. Depending on the runtime environment, either a `new Worker()` or a `new require('worker_threads').Worker()` NodeJS equivalent will be Spawned.

`Source`

packages/bus/index.ts:1

bus.**Bus** *(Class)*

The **Bus** class presents an easy way to establish duplex streams. Through the on-construction supplied Handle the mount point of the created duplex streaming **Bus** within the hierarchical structure of streams handled by the BusHandler is designated. Thereby, all Values emitted by the created **Bus** originate from streams beneath the supplied Handle and when invoking the next method of the implemented Observer contract, the resulting Value will originate from this supplied Handle.

An instantiated **Bus** allows for two modes of observation to facilitate simple and complex use cases. The implemented Subscribable contract allows for observation of the dematerialized Values, while the well-known `Symbol.observable` method provides a way to observe the raw Values, including their originating Handles.

`Example`

Using a duplex streaming **Bus**:

```
import { Bus } from '@sgrud/bus';

const bus = new Bus<string, string>('io.github.sgrud.example');

bus.subscribe({ next: console.log });
bus.next('value');
bus.complete();
```

`Type parameters`

Name	Description
`I`	The input value type of a **Bus** instance.
`O`	The output value type of a **Bus** instance.

`Implements`

`Observer<I>`, `Subscribable<O>`

`Source`

packages/bus/src/bus/bus.ts:14, packages/bus/src/bus/bus.ts:109

bus.Bus.**[observable]** *(Method)*

Well-known `Symbol.observable` method returning a Subscribable. The returned Subscribable emits the raw Values observed by this Bus. By comparison, the implemented subscribe method of the Subscribable interface dematerializes these raw Values before passing them through to the Observer.

`Example`

Subscribe to a raw Bus:

```
import { Bus } from '@sgrud/bus';
import { from } from 'rxjs';

const bus = new Bus<string, string>('io.github.sgrud.example');
from(bus).subscribe(console.log);
```

Signature

```
[observable](): Subscribable<Value<O>>
```

Returns

A Subscribable emitting raw Values.

Source

packages/bus/src/bus/bus.ts:179

bus.Bus.**complete** *(Method)*

Implemented **complete** method of the Observer contract. Invoking this method will mark the publishing side of this duplex Bus as **complete**d.

Example

complete a Bus:

```
import { Bus } from '@sgrud/bus';

const bus = new Bus<string, string>('io.github.sgrud.example');
bus.complete();
```

Signature

```
complete(): void
```

Source

packages/bus/src/bus/bus.ts:197

bus.Bus.**constructor** *(Constructor)*

Public Bus **constructor**. The Handle supplied to this **constructor** is assigned as `readonly` on the constructed Bus instance and will be used to determine the mount point of this duplex stream within the hierarchical structure of streams handled by the BusHandler.

Signature

```
new Bus<I, O>(handle)
```

Type parameters

Name	Description
`I`	The input value type of a **Bus** instance.
`O`	The output value type of a **Bus** instance.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle to publish this Bus under.

Source

packages/bus/src/bus/bus.ts:136

bus.Bus.**error** *(Method)*

Implemented **error** method of the Observer contract. Invoking this method will throw the supplied `error` on the publishing side of this duplex Bus.

Example

Throw an **error** through a Bus:

```
import { Bus } from '@sgrud/bus';

const bus = new Bus<string, string>('io.github.sgrud.example');
bus.error(new Error('example));
```

Signature

```
error(error): void
```

Parameters

Name	Type	Description
`error`	`unknown`	The `error` to publish.

Source

packages/bus/src/bus/bus.ts:217

bus.Bus.**handle** *(Readonly Property)*

The Handle to publish this Bus under.

Source

packages/bus/src/bus/bus.ts:141

bus.Bus.**next** *(Method)*

Implemented **next** method of the Observer contract. Invoking this method will provide any observer of the publishing side of this duplex Bus with the **next** `value`.

Example

Supplying a Bus with a **next** value:

```
import { Bus } from '@sgrud/bus';

const bus = new Bus<string, string>('io.github.sgrud.example');
bus.next('value');
```

Signature

```
next(value): void
```

Parameters

Name	Type	Description
`value`	`I`	The **next** `value` to publish.

Source

packages/bus/src/bus/bus.ts:237

bus.Bus.**subscribe** *(Method)*

Implemented **subscribe** method of the Subscribable contract. Invoking this method while supplying an `observer` will **subscribe** the supplied `observer` to any changes on the observed side of this duplex Bus.

Example

subscribe to a dematerialized Bus:

```
import { Bus } from '@sgrud/bus';

const bus = new Bus<string, string>('io.github.sgrud.example');
bus.subscribe({ next: console.log });
```

Signature

```
subscribe(observer?): Unsubscribable
```

Returns

An Unsubscribable of the ongoing observation.

Parameters

Name	Type	Description
`observer?`	`Partial<Observer<O>>`	The `observer` to **subscribe** to this Bus.

Source

packages/bus/src/bus/bus.ts:259

bus.Bus.**observe** *(Private Readonly Property)*

The **observe**d side of this Bus. The Observable assigned to this property is used to fullfil the Subscribable contract and is obtained through the BusHandler.

Source

packages/bus/src/bus/bus.ts:116

bus.Bus.**publish** *(Private Readonly Property)*

The **publish**ing side of this Bus. The Subject assigned to this property is used to fullfil the Observer contract and is provided to the BusHandler for **publish**ment.

Source

packages/bus/src/bus/bus.ts:123

bus.**Bus** *(Namespace)*

The **Bus** namespace contains types and interfaces used and intended to be used in conjunction with the Singleton BusHandler class. This namespace contains the Handle string literal type helper, designating the hierarchical mount-point of any **Bus**, as well as the Value type helper, describing the data and state a **Bus** may transport.

See

Bus

Source

packages/bus/src/bus/bus.ts:14, packages/bus/src/bus/bus.ts:109

bus.Bus.**Handle** *(Type alias)*

The **Handle** string literal helper type enforces any assigned value to contain at least three dots. It represents a type constraint which should be thought of as domain name in reverse notation. All employed **Handle**s thereby designate a hierarchical structure, which the BusHandler in conjunction with the BusWorker operate upon.

Example

Library-wide **Handle**:

```
import { type Bus } from '@sgrud/bus';

const busHandle: Bus.Handle = 'io.github.sgrud';
```

Example

An invalid **Handle**:

```
import { type Bus } from '@sgrud/bus';

const busHandle: Bus.Handle = 'org.example';
// Type [...] is not assignable to type 'Handle'.
```

See

BusHandler

Source

packages/bus/src/bus/bus.ts:42

bus.Bus.**Value** *(Type alias)*

The **Value** type helper extends the ObservableNotification type and describes the shape of all values emitted by any stream handled by the BusHandler. As those streams are Observables, which are dynamically combined through their hierarchical structure denoted by their corresponding Handles and therefore may emit from more than one Handle, each **Value** emitted by any bus contains its originating Handle.

Example

Logging emitted **Value**s:

```
import { BusHandler } from '@sgrud/bus';

const busHandler = new BusHandler();
busHandler.observe('io.github.sgrud').subscribe(console.log);
// { handle: 'io.github.sgrud.example', type: 'N', value: 'published' }
```

See

BusHandler

Type parameters

Name	Description
`T`	The Bus **Value** type.

Source

packages/bus/src/bus/bus.ts:67

bus.**BusHandler** *(Class)*

The **BusHandler** implements and orchestrates the establishment, transferral and deconstruction of any number of Observable streams. It operates in conjunction with the BusWorker Thread which is run in the background. To designate and organize different Observable streams, the string literal helper type Handle is employed. As an example, let the following hierarchical structure be given:

```
io.github.sgrud
├── io.github.sgrud.core
│   ├── io.github.sgrud.core.kernel
│   └── io.github.sgrud.core.transit
├── io.github.sgrud.data
│   ├── io.github.sgrud.data.model.current
│   └── io.github.sgrud.data.model.global
└── io.github.sgrud.shell
```

```
|   └── io.github.sgrud.shell.route
└── io.github.sgrud.store
    ├── io.github.sgrud.store.global
    └── io.github.sgrud.store.local
```

Depending on the Handle, one may observe all established streams beneath the root `io.github.sgrud` Handle or only one specific stream, e.g., `io.github.sgrud.core.kernel`. The Observable returned from the observe method will emit all Values originating from all streams beneath the root Handle in the first case, or only Values from one stream, in the second case.

Decorator

Singleton

See

BusWorker

Source

packages/bus/src/handler/handler.ts:46

bus.BusHandler.[observable] *(Static Method)*

Static `Symbol.observable` method returning a Subscribable. The returned Subscribable mirrors the private loader and is used for initializations after the BusHandler has been successfully initialized.

Example

Subscribe to the BusHandler:

```
import { BusHandler } from '@sgrud/bus';
import { from } from 'rxjs';

from(BusHandler).subscribe(console.log);
```

Signature

```
[observable](): Subscribable<BusHandler>
```

Returns

A Subscribable emitting this BusHandler.

Source

packages/bus/src/handler/handler.ts:72

bus.BusHandler.loader *(Static Private Property)*

Private static ReplaySubject used as the BusHandler **loader**. This **loader** emits once after the BusHandler has been successfully initialized.

Source

packages/bus/src/handler/handler.ts:53

bus.BusHandler.constructor *(Constructor)*

Public BusHandler **constructor**. As the BusHandler is a Singleton class, this **constructor** is only invoked the first time it is targeted by the `new` operator. Upon this first invocation, the worker property is assigned an instance of the BusWorker Thread while using the supplied `source`, if any.

Throws

A ReferenceError when the environment is incompatible.

Signature

```
new BusHandler(source?)
```

Parameters

Name	Type	Description
`source?`	`string`	An optional Module `source`.

`Source`

packages/bus/src/handler/handler.ts:104

bus.BusHandler.**observe** *(Method)*

Invoking this method **observe**s the Observable stream represented by the supplied `handle`. The method will return an Observable originating from the BusWorker which emits all Values published under the supplied `handle`. When the **observe** method is invoked with `'io.github.sgrud'`, all streams hierarchically beneath this Handle, e.g., `'io.github.bus.status'`, will also be emitted by the returned Observable.

`Example`

observe the `'io.github.sgrud'` stream:

```ts
import { BusHandler } from '@sgrud/bus';

const busHandler = new BusHandler();
const handle = 'io.github.sgrud.example';

busHandler.observe(handle).subscribe(console.log);
```

`Signature`

```ts
observe<T>(handle): Observable<Value<T>>
```

`Returns`

An Observable bus for `handle`.

`Type parameters`

Name	Description
`T`	The type of the **observe**d Observable stream.

`Parameters`

Name	Type	Description
`handle`	`Handle`	The Handle to **observe**.

`Source`

packages/bus/src/handler/handler.ts:160

bus.BusHandler.**publish** *(Method)*

Invoking this method **publish**es the supplied Observable `stream` under the supplied `handle`. This method returns an Observable of the **publish**ment of the supplied Observable `stream` under the supplied `handle` with the BusWorker. When the **publish**ed `source` Observable completes, the registration within the BusWorker will automatically self-destruct.

`Example`

publish a stream under `'io.github.sgrud.example'`:

```ts
import { BusHandler } from '@sgrud/bus';
import { of } from 'rxjs';

const busHandler = new BusHandler();
const handle = 'io.github.sgrud.example';
const stream = of('published');
```

```
busHandler.publish(handle, stream).subscribe();
```

Signature

```
publish<T>(handle, stream): Observable<void>
```

Returns

An Observable of the `stream` **publish**ment.

Type parameters

Name	Description
`T`	The type of the **publish**ed Observable stream.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle to **publish** under.
`stream`	`ObservableInput<T>`	The Observable `stream` for `handle`.

Source

packages/bus/src/handler/handler.ts:193

bus.BusHandler.**uplink** *(Method)*

Invoking this method **uplink**s the supplied `handle` to the supplied `url` by establishing a WebSocket connection between the endpoint behind the supplied `url` and the BusWorker. This method returns an Observable of the **uplink** Subscription which can be used to cancel the **uplink**. When the **uplink**ed WebSocket is closed or throws an error, it is automatically cleaned up and unsubscribed from.

Example

uplink the `'io.github.sgrud.uplink'` Handle:

```
import { BusHandler } from '@sgrud/bus';

const busHandler = new BusHandler();
const handle = 'io.github.sgrud.example';
const url = 'https://example.com/websocket';

const uplink = busHandler.uplink(handle, url).subscribe();
```

Signature

```
uplink(handle, url): Observable<Subscription>
```

Returns

An Observable of the **uplink** Subscription.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle to **uplink**.
`url`	`string`	The endpoint `url` to establish an **uplink** to.

Source

packages/bus/src/handler/handler.ts:231

bus.BusHandler.**worker** *(Readonly Property)*

The **worker** Thread and main background workhorse. The underlying BusWorker is run inside a Worker context in the background and transparently handles published and observed streams and the aggregation of their values depending on their Handle, i.e., hierarchy.

See

BusWorker

Source

packages/bus/src/handler/handler.ts:92

bus.**BusQuerier** *(Class)*

The **BusQuerier** implements an Bus based Querier, i.e., extension of the abstract Querier base class, allowing Model queries to be executed via a Bus. To use this class, provide it to the Linker by either extending it, and decorating the extending class with the Target decorator, or by preemptively supplying an instance of this class to the Linker.

Example

Provide the **BusQuerier** to the Linker:

```
import { BusQuerier } from '@sgrud/bus';
import { Linker } from '@sgrud/core';

new Linker<typeof BusQuerier>([
  [BusQuerier, new BusQuerier('io.github.sgrud.example')]
]);
```

See

Model, Querier

Hierarchy

- `Querier<this>`
  - **BusQuerier**

Source

packages/bus/src/bus/querier.ts:28

bus.BusQuerier.**[provide]** *(Static Readonly Property)*

Magic string by which this class is provided.

See

provide

Source

packages/data/src/querier/querier.ts:96

bus.BusQuerier.**commit** *(Method)*

Overridden **commit** method of the Querier base class. When this Querier is made available via the Linker, this overridden **commit** method is called when this Querier claims the highest priority to **commit** an Operation, depending on the Model from which the Operation originates.

Signature

```
commit(operation, variables): Observable<unknown>
```

Returns

An Observable of the **commit**ted `operation`.

Parameters

Name	Type	Description
`operation`	`Operation`	The Operation to be **commit**ted.
`variables`	`Variables`	Any Variables within the `operation`.

Source

packages/bus/src/bus/querier.ts:82

bus.BusQuerier.**constructor** *(Constructor)*

Public **constructor** consuming the `handle` Model queries should be committed through, and an dynamic or static `prioritize` value. The `prioritize` value may either be a mapping of Models to corresponding priorities or a static priority for this Querier.

Signature

```
new BusQuerier(handle, prioritize?)
```

Parameters

Name	Type	Default value	Description
`handle`	`Handle`	`undefined`	The Handle to commit queries under.
`prioritize`	`number` | `Map<Type<Model<any>>, number>`	`0`	The dynamic or static prioritization.

Source

packages/bus/src/bus/querier.ts:51

bus.BusQuerier.**priority** *(Method)*

Overridden **priority** method of the Querier base class. When an Operation is to be committed, this method is called with the respective `model` Type and returns the claimed **priority** to commit this Model.

Signature

```
priority(model): number
```

Returns

The numeric **priority** of this Querier implementation.

Parameters

Name	Type	Description
`model`	`Type<Model<any>>`	The Model to be committed.

Source

packages/bus/src/bus/querier.ts:107

bus.BusQuerier.**types** *(Readonly Property)*

A set containing the Types this BusQuerier handles. As a Bus is a long-lived duplex stream, this Querier can handle `'mutation'`, `'query'` and `'subscription'` **types**.

Source

packages/bus/src/bus/querier.ts:36

bus.BusQuerier.**handle** *(Private Readonly Property)*

The Handle to commit queries under.

Source

packages/bus/src/bus/querier.ts:56

bus.BusQuerier.**prioritize** *(Private Readonly Property)*

The dynamic or static prioritization.

See

priority

Source

packages/bus/src/bus/querier.ts:65

bus.**BusWorker** *(Class)*

The **BusWorker** is a background Thread which is Spawned by the BusHandler to handle all published and observed streams, uplinks and their aggregation depending on their hierarchy.

Decorator

Thread, Singleton

See

BusHandler

Source

packages/bus/src/worker/index.ts:24

bus.BusWorker.**constructor** *(Constructor)*

Public **constructor**. This **constructor** is called once when the BusHandler Spawns this BusWorker.

Remarks

This method should only be invoked by the BusHandler.

Signature

```
new BusWorker()
```

Source

packages/bus/src/worker/index.ts:52

bus.BusWorker.**observe** *(Method)*

Invoking this method **observe**s all Observable streams under the supplied `handle` by mergeing all streams which are published under the supplied `handle`.

Remarks

This method should only be invoked by the BusHandler.

Signature

```
observe<T>(handle): Promise<Observable<Value<T>>>
```

Returns

An Observable stream for `handle`.

Type parameters

Name	Description
`T`	The type of the **observe**d Observable stream.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle to **observe**.

Source

packages/bus/src/worker/index.ts:69

bus.BusWorker.**publish** *(Method)*

Invoking this method **publish**es the supplied ObservableInput `stream` under the supplied `handle`. Any emittance of the **publish**ed `stream` will be materialized into Values and replayed once to every observer.

Throws

A ReferenceError on collision of `handle`s.

Remarks

This method should only be invoked by the BusHandler.

Signature

```
publish<T>(handle, stream): Promise<void>
```

Returns

A Promise of the `stream` **publish**ment.

Type parameters

Name	Description
`T`	The type of the **publish**ed Observable stream.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle to **publish** under.
`stream`	`ObservableInput<T>`	The ObservableInput `stream` for `handle`.

Source

packages/bus/src/worker/index.ts:113

bus.BusWorker.**uplink** *(Method)*

Invoking this method **uplink**s the supplied `handle` to the supplied `url` by establishing a WebSocket connection between the endpoint behind the supplied `url` and this BusWorker. It is assumed, that all messages emanating from the WebSocket endpoint conform to the Value type and are therefore treated as such. This treatment includes the filtering of all received and submitted messages by comparing their corresponding Handle and the supplied `handle`.

`Throws`

A ReferenceError on collision of `handle`s.

`Remarks`

This method should only be invoked by the BusHandler.

`Signature`

```
uplink(handle, url): Promise<Subscription>
```

`Returns`

A Promise of the Subscription to the **uplink**.

`Parameters`

Name	Type	Description
`handle`	`Handle`	The Handle to **uplink**.
`url`	`string`	The endpoint `url` to establish an **uplink** to.

`Source`

packages/bus/src/worker/index.ts:152

bus.BusWorker.**changes** *(Private Readonly Property)*

BehaviorSubject emitting every time when **changes** occur on the internal streams or uplinks mappings. This emittance is used to recombine the Observable streams which were previously obtained to through use of the observe method.

`Source`

packages/bus/src/worker/index.ts:32

bus.BusWorker.**streams** *(Private Readonly Property)*

Internal Mapping containing all established **streams**. Updating this map should always be accompanied by an emittance of changes.

`Source`

packages/bus/src/worker/index.ts:38

bus.BusWorker.**uplinks** *(Private Readonly Property)*

Internal Mapping containing all established **uplinks**. Updating this map should always be accompanied by an emittance of changes.

`Source`

packages/bus/src/worker/index.ts:44

bus.**Observe** *(Function)*

Prototype property decorator factory. Applying this decorator replaces the decorated property with a getter returning an Observable stream which **Observe**s all values originating from the supplied `handle`. Depending on the value of the `suffix` parameter, this Observable stream

is either assigned directly to the prototype using the supplied `handle`, or, if a truthy value is supplied for the `suffix` parameter, this value is assumed to reference another property of the class containing this decorated property. The first truthy value assigned to this `suffix` property on an instance of the class containing this **Stream** decorator will then be used to suffix the supplied `handle` which is to be **Observe**d and assign the resulting Observable stream to the decorated instance property.

This decorator is more or less the opposite of the Publish decorator, while both rely on the BusHandler to fulfill contracts.

Example

Observe the `'io.github.sgrud.example'` stream:

```
import { type Bus, Observe } from '@sgrud/bus';
import { type Observable } from 'rxjs';

export class Observer {

  @Observe('io.github.sgrud.example')
  public readonly stream!: Observable<Bus.Value<unknown>>;

}

Observer.prototype.stream.subscribe(console.log);
```

Example

Observe the `'io.github.sgrud.example'` stream:

```
import { type Bus, Observe } from '@sgrud/bus';
import { type Observable } from 'rxjs';

export class Observer {

  @Observe('io.github.sgrud', 'suffix')
  public readonly stream!: Observable<Bus.Value<unknown>>;

  public constructor(
    public readonly suffix: string
  ) { }

}

const observer = new Observer('example');
observer.stream.subscribe(console.log);
```

See

BusHandler, Publish, Stream

Signature

```
Observe(handle, suffix?): (prototype: object, propertyKey: PropertyKey) => void
```

Returns

A prototype property decorator.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle to **Observe**.
`suffix?`	`PropertyKey`	An optional `suffix` property for the `handle`.

Source

packages/bus/src/handler/observe.ts:66

bus.**Publish** *(Function)*

Prototype property decorator factory. This decorator **Publish**es a newly instantiated Subject under the supplied `handle` and assigns it to the decorated property. Depending on the value of the `suffix` parameter, this newly instantiated Subject is either assigned directly to the prototype

and **Publish**ed using the supplied `handle`, or, if a truthy value is supplied for the `suffix` parameter, this value is assumed to reference another property of the class containing this decorated property. The first truthy value assigned to this `suffix` property on an instance of the class containing this **Publish** decorator will then be used to suffix the supplied `handle` upon **Publish**ment of the newly instantiated Subject, which is assigned to the decorated instance property.

Through these two different modes of operation, the Subject that will be **Publish**ed can be assigned statically to the prototype of the class containing the decorated property, or this assignment can be deferred until an instance of the class containing the decorated property is constructed and a truthy value is assigned to its `suffix` property.

This decorator is more or less the opposite of the Observe decorator, while both rely on the BusHandler to fulfill contracts. Furthermore, precautions should be taken to ensure the completion of the **Publish**ed Subject as memory leaks may occur due to dangling subscriptions.

Example

Publish the `'io.github.sgrud.example'` stream:

```
import { Publish } from '@sgrud/bus';
import { type Subject } from 'rxjs';

export class Publisher {

  @Publish('io.github.sgrud.example')
  public readonly stream!: Subject<unknown>;

}

Publisher.prototype.stream.next('value');
Publisher.prototype.stream.complete();
```

Example

Publish the `'io.github.sgrud.example'` stream:

```
import { Publish } from '@sgrud/bus';
import { type Subject } from 'rxjs';

export class Publisher {

  @Publish('io.github.sgrud', 'suffix')
  public readonly stream: Subject<unknown>;

  public constructor(
    private readonly suffix: string
  ) {}

}

const publisher = new Publisher('example');
publisher.stream.next('value');
publisher.stream.complete();
```

See

BusHandler, Observe, Stream

Signature

```
Publish(handle, suffix?): (prototype: object, propertyKey: PropertyKey) => void
```

Returns

A prototype property decorator.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle to **Publish**.
`suffix?`	`PropertyKey`	An optional `suffix` property for the `handle`.

Source

packages/bus/src/handler/publish.ts:76

bus.**Stream** *(Function)*

Prototype property decorator factory. Applying this decorator replaces the decorated property with a getter returning a Bus, thereby allowing to duplex **Stream** values designated by the supplied `handle`. Depending on the value of the `suffix` parameter, this Bus is either assigned directly to the prototype using the supplied `handle`, or, if a truthy value is supplied for the `suffix` parameter, this value is assumed to reference another property of the class containing this decorated property. The first truthy value assigned to this `suffix` property on an instance of the class containing this **Stream** decorator will then be used to suffix the supplied `handle` upon construction of the Bus, which is assigned to the decorated instance property.

Through these two different modes of operation, a Bus can be assigned statically to the prototype of the class containing the decorated property, or this assignment can be deferred until an instance of the class containing the decorated property is constructed and a truthy value is assigned to its `suffix` property.

Example

Stream `'io.github.sgrud.example'`:

```
import { type Bus, Stream } from '@sgrud/bus';

export class Streamer {

  @Stream('io.github.sgrud.example')
  public readonly stream!: Bus<unknown, unknown>;

}

Streamer.prototype.stream.next('value');
Streamer.prototype.stream.complete();

Streamer.prototype.stream.subscribe({
  next: console.log
});
```

Example

Stream `'io.github.sgrud.example'`:

```
import { type Bus, Stream } from '@sgrud/bus';

export class Streamer {

  @Stream('io.github.sgrud', 'suffix')
  public readonly stream!: Bus<unknown>;

  public constructor(
    public readonly suffix: string
  ) { }

}

const streamer = new Streamer('example');
streamer.stream.next('value');
streamer.stream.complete();

streamer.stream.subscribe({
  next: console.log
});
```

See

BusHandler, Observe, Publish

Signature

```
Stream(handle, suffix?): (prototype: object, propertyKey: PropertyKey) => void
```

Returns

A prototype property decorator.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle to **Stream**.

`suffix?`	`PropertyKey`	An optional `suffix` property for the `handle`.

`Source`

packages/bus/src/handler/stream.ts:75

core Module

`@sgrud/core` - The SGRUD Core Module.

The functions and classes found within the **`@sgrud/core`** module represent the base upon which the SGRUD client libraries are built. Therefore, most of the code provided within this module does not aim at fulfilling one specific high-level need, but is used and intended to be used as low-level building blocks for downstream projects. This practice is employed throughout the SGRUD client libraries, as all modules depend on this core module. By providing the core functionality within this singular module, all downstream SGRUD modules should be considered opt-in functionality which may be used within projects building upon the SGRUD client libraries.

Source

packages/core/index.ts:1

core.**Alias** *(Type alias)*

Type helper **Alias**ing any provided `Type`. By looping a `Type` through this **Alias** type helper, the dereferencing of this `Type` is prohibited. Use this helper to, e.g., force a string literal type to be treated as an unique type and not to be dereferenced.

Example

Alias the `${number} ${'<' | '>'} ${number}` type:

```ts
import { type Alias } from '@sgrud/core';

type Helper = Alias<`${number} ${'<' | '>'} ${number}`>;

const negative: Helper = '-01 < +0.1'; // negative: Helper
const positive: Helper = 'one is > 0'; // not assignable to type 'Helper'
```

Remarks

https://github.com/microsoft/TypeScript/issues/47828

Type parameters

Name	Description
`T`	The type that should be **Alias**ed.

Source

packages/core/src/typing/alias.ts:22

core.**Assign** *(Type alias)*

Type helper **Assign**ing the own property types of all of the enumerable own properties from a source type to a target type.

Example

Assign `valueOf()` to `string`:

```ts
import { type Assign } from '@sgrud/core';

const str = 'Hello world' as Assign<{
  valueOf(): 'Hello world';
}, string>;
```

Type parameters

Name	Description
`S`	The source type to **Assign** from.
`T`	The target type to **Assign** to.

Source

packages/core/src/typing/assign.ts:18

core.**Factor** *(Function)*

Prototype property decorator factory. Applying this decorator replaces the decorated prototype property with a getter, which returns the linked instance of a Targeted constructor, referenced by the `targetFactory`. Depending on the supplied `transient` value, the target constructor is invoked to construct (and link) an instance, if none is linked beforehand.

`Example`

Factor an eager and lazy service:

```
import { Factor } from '@sgrud/core';
import { EagerService, LazyService } from './services';

export class ServiceHandler {

  @Factor(() => EagerService)
  private readonly service!: EagerService;

  @Factor(() => LazyService, true)
  private readonly service?: LazyService;

}
```

`See`

Linker, Target

`Signature`

```
Factor<K>(targetFactory, transient?): (prototype: object, propertyKey: PropertyKey) => void
```

`Returns`

A prototype property decorator.

`Type parameters`

Name	Type	Description
`K`	extends () => `any`	The Targeted constructor type.

`Parameters`

Name	Type	Default value	Description
`targetFactory`	() => `K`	`undefined`	A forward reference to the target constructor.
`transient`	`boolean`	`false`	Whether an instance is constructed if none is linked.

`Source`

packages/core/src/linker/factor.ts:35

core.**Http** *(Abstract Class)*

The abstract **Http** class is a thin wrapper around the ajax method. The main function of this wrapper is to pipe all requests through a chain of classes extending the abstract Proxy class. Thereby interceptors for various requests can be implemented to, e.g., provide API credentials etc.

`See`

Proxy

`Implements`

`Handler`

`Source`

packages/core/src/http/http.ts:13, packages/core/src/http/http.ts:57

core.Http.**delete** *(Static Method)*

Fires an Http **delete** request against the supplied `url` upon subscription.

Example

Fire an HTTP **delete** request against `https://example.com`:

```
import { Http } from '@sgrud/core';

Http.delete('https://example.com').subscribe(console.log);
```

Signature

```
delete<T>(url): Observable<Response<T>>
```

Returns

An Observable of the Response.

Type parameters

Name	Description
`T`	The Response type.

Parameters

Name	Type	Description
`url`	`string`	The `url` to Http **delete**.

Source

packages/core/src/http/http.ts:75

core.Http.**get** *(Static Method)*

Fires an Http **get** request against the supplied `url` upon subscription.

Example

Fire an HTTP **GET** request against `https://example.com`:

```
import { Http } from '@sgrud/core';

Http.get('https://example.com').subscribe(console.log);
```

Signature

```
get<T>(url): Observable<Response<T>>
```

Returns

An Observable of the Response.

Type parameters

Name	Description
`T`	The Response type.

Parameters

Name	Type	Description
`url`	`string`	The `url` to Http **get**.

Source

packages/core/src/http/http.ts:95

core.Http.**head** *(Static Method)*

Fires an Http **head** request against the supplied `url` upon subscription.

Example

Fire an HTTP **head** request against `https://example.com`:

```
import { Http } from '@sgrud/core';

Http.head('https://example.com').subscribe(console.log);
```

Signature

```
head<T>(url): Observable<Response<T>>
```

Returns

An Observable of the Response.

Type parameters

Name	Description
`T`	The Response type.

Parameters

Name	Type	Description
`url`	`string`	The `url` to Http **head**.

Source

packages/core/src/http/http.ts:115

core.Http.**patch** *(Static Method)*

Fires an Http **patch** request against the supplied `url` containing the supplied `body` upon subscription.

Example

Fire an HTTP **patch** request against `https://example.com`:

```
import { Http } from '@sgrud/core';

Http.patch('https://example.com', {
  data: 'value'
}).subscribe(console.log);
```

Signature

```
patch<T>(url, body): Observable<Response<T>>
```

Returns

An Observable of the Response.

Type parameters

Name	Description
`T`	The Response type.

Parameters

Name	Type	Description
`url`	`string`	The `url` to Http **patch**.
`body`	`unknown`	The `body` of the Request.

Source

packages/core/src/http/http.ts:138

core.Http.**post** *(Static Method)*

Fires an Http **post** request against the supplied `url` containing the supplied `body` upon subscription.

Example

Fire an HTTP **post** request against `https://example.com`:

```
import { Http } from '@sgrud/core';

Http.post('https://example.com', {
  data: 'value'
}).subscribe(console.log);
```

Signature

```
post<T>(url, body): Observable<Response<T>>
```

Returns

An Observable of the Response.

Type parameters

Name	Description
`T`	The Response type.

Parameters

Name	Type	Description
`url`	`string`	The `url` to Http **post**.
`body`	`unknown`	The `body` of the Request.

Source

packages/core/src/http/http.ts:164

core.Http.**put** *(Static Method)*

Fires an Http **put** request against the supplied `url` containing the supplied `body` upon subscription.

Example

Fire an HTTP **put** request against `https://example.com`:

```
import { Http } from '@sgrud/core';

Http.put('https://example.com', {
  data: 'value'
}).subscribe(console.log);
```

Signature

```
put<T>(url, body): Observable<Response<T>>
```

Returns

An Observable of the Response.

Type parameters

Name	Description
`T`	The Response type.

Parameters

Name	Type	Description
`url`	`string`	The `url` to Http **put**.
`body`	`unknown`	The `body` of the Request.

Source

packages/core/src/http/http.ts:190

core.Http.**request** *(Static Method)*

Fires a custom Request. Use this method for more fine-grained control over the outgoing Request.

Example

Fire an HTTP custom request against `https://example.com`:

```
import { Http } from '@sgrud/core';

Http.request({
  method: 'GET',
  url: 'https://example.com',
  headers: { 'x-example': 'value' }
}).subscribe(console.log);
```

Signature

```
request<T>(request): Observable<Response<T>>
```

Returns

An Observable of the Response.

Type parameters

Name	Description
`T`	The Response type.

Parameters

Name	Type	Description
`request`	`Request`	The Request to be **request**ed.

Source

packages/core/src/http/http.ts:217

core.Http.**handle** *(Method)*

Generic **handle** method, enforced by the Handler interface. Main method of the this class. Internally pipes the `request` through all linked classes extending Proxy.

Signature

```
handle<T>(request): Observable<Response<T>>
```

Returns

An Observable of the Response.

Type parameters

Name	Description
`T`	The type of the **handle**d Response.

Parameters

Name	Type	Description
`request`	`Request`	The Request to be **handle**d.

Source

packages/core/src/http/http.ts:241

core.Http.**constructor** *(Private Constructor)*

Private **constructor** (which should never be called).

Throws

A TypeError upon construction.

Signature

```
new Http()
```

Source

packages/core/src/http/http.ts:228

core.**Http** *(Namespace)*

The **Http** namespace contains types and interfaces used and intended to be used in conjunction with the abstract Http class.

See

Http

Source

packages/core/src/http/http.ts:13, packages/core/src/http/http.ts:57

core.Http.**Handler** *(Interface)*

The **Handler** interface enforces the handle method with ajax compliant typing on the implementing class or object. This contract is used by the Proxy to type-guard the next hops.

Implemented by

`Http`

Source

packages/core/src/http/http.ts:34

core.Http.Handler.**handle** *(Method)*

Generic **handle** method enforcing ajax compliant typing. The method signature corresponds to that of the ajax method itself.

Signature

```
handle(request): Observable<Response<any>>
```

Returns

An Observable of the requested Response.

Parameters

Name	Type	Description
`request`	`Request`	Requesting Request.

Source

packages/core/src/http/http.ts:43

core.Http.**Request** *(Type alias)*

The **Request** type alias references the AjaxConfig interface and describes the shape of any Http **Request** parameters.

Source

packages/core/src/http/http.ts:19

core.Http.**Response** *(Type alias)*

The **Response** type alias references the AjaxResponse class and describes the shape of any Http **Response**.

Type parameters

Name	Type	Description
`T`	`any`	The **Response** type of a Request.

Source

packages/core/src/http/http.ts:27

core.**Kernel** *(Class)*

Singleton **Kernel** class. The **Kernel** is essentially a dependency loader for ESM bundles (and their respective `importmaps`) or, depending on the runtime context and capabilities, UMD bundles and their transitive dependencies. By making use of the **Kernel**, applications based on the SGRUD client libraries may be comprised of multiple, optionally loaded Modules.

Decorator

Singleton

Source

packages/core/src/kernel/kernel.ts:16, packages/core/src/kernel/kernel.ts:159

core.Kernel.[observable] *(Method)*

Well-known `Symbol.observable` method returning a Subscribable. The returned Subscribable emits every Module that is successfully loaded.

Example

Subscribe to the loaded Modules:

```
import { Kernel } from '@sgrud/core';
import { from } from 'rxjs';

from(new Kernel()).subscribe(console.log);
```

Signature

```
[observable](): Subscribable<Module>
```

Returns

A Subscribable emitting loaded Modules.

Source

packages/core/src/kernel/kernel.ts:265

core.Kernel.constructor *(Constructor)*

Singleton **constructor**. The first time, this **constructor** is called, it will persist the nodeModules path Modules should be loaded from. Subsequent **constructor** calls will ignore this argument and return the Singleton instance. Through subscribing to the Subscribable returned by the well-known `Symbol.observable` method, the Module loading progress can be tracked.

Example

Instantiate the **Kernel** and require Modules:

```
import { Kernel } from '@sgrud/core';
import { forkJoin } from 'rxjs';

const kernel = new Kernel('https://unpkg.com');

forkJoin([
  kernel.require('example-module'),
  kernel.require('/static/local-module')
]).subscribe(console.log);
```

Signature

```
new Kernel(nodeModules?)
```

Parameters

Name	Type	Default value	Description
`nodeModules`	`string`	`'/node_modules'`	Optional location to load node modules from.

Source

packages/core/src/kernel/kernel.ts:221

core.Kernel.insmod *(Method)*

Calling this method while supplying a valid `module` definition will chain the **ins**ert **mod**ule operations of the `module` dependencies and the `module` itself into an Observable, which is then returned. When multiple Modules are inserted, their dependencies are deduplicated by internally tracking all Modules and their transitive dependencies as separate loaders. Depending on the browser context, either the UMD or ESM bundles (and their respective `importmaps`) are loaded via calling the script method. When **insmod**ding Modules which contain transitive sgrudDependencies, their compatibility is checked. Should a dependency version mismatch, the Observable returned by this method will throw.

Throws

An Observable RangeError or ReferenceError.

Example

insmod a Module by definition:

```
import { Kernel } from '@sgrud/core';
import packageJson from './module/package.json';

new Kernel().insmod(packageJson).subscribe(console.log);
```

Signature

```
insmod(module, source?, execute?): Observable<Module>
```

Returns

An Observable of the Module definition.

Parameters

Name	Type	Default value	Description
`module`	`Module`	`undefined`	The Module definition to **insmod**.
`source`	`string`	`undefined`	An optional Module `source`.
`execute`	`boolean`	`false`	Whether to `execute` the Module.

Source

packages/core/src/kernel/kernel.ts:298

core.Kernel.**nodeModules** *(Readonly Property)*

Optional location to load node modules from.

Source

packages/core/src/kernel/kernel.ts:228

core.Kernel.**require** *(Method)*

requires a Module by name or source. If the supplied `id` is a relative path starting with `./`, an absolute path starting with `/` or an URL starting with `http`, the `id` is used as-is, otherwise it is appended to the nodeModules path and the `package.json` file within this path is retrieved via Http GET. The Module definition is then passed to the insmod method and returned.

Example

require a Module by `id`:

```
import { Kernel } from '@sgrud/core';

new Kernel().require('/static/lazy-module').subscribe(console.log);
```

Signature

```
require(id, execute?): Observable<Module>
```

Returns

An Observable of the Module definition.

Parameters

Name	Type	Default value	Description
`id`	`string`	`undefined`	The Module name or source to **require**.
`execute`	`boolean`	`true`	Whether to `execute` the Module.

`Source`

packages/core/src/kernel/kernel.ts:427

core.Kernel.**resolve** *(Method)*

resolves a Module definition by its `name`. The Module `name` is appended to the `source` path or, of none is supplied, the nodeModules path and the `package.json` file therein retrieved via Http GET. The parsed `package.json` is then emitted by the returned Observable.

`Example`

resolve a Module definition:

```
import { Kernel } from '@sgrud/core';

new Kernel().resolve('module').subscribe(console.log);
```

`Signature`

```
resolve(name, source?): Observable<Module>
```

`Returns`

An Observable of the Module definition.

`Parameters`

Name	Type	Description
`name`	`string`	The Module `name` to **resolve**.
`source`	`string`	An optional Module `source`.

`Source`

packages/core/src/kernel/kernel.ts:461

core.Kernel.**script** *(Method)*

Inserts an HTMLScriptElement and applies the supplied `props` to it. The returned Observable emits and completes when the `onload` handler of the HTMLScriptElement is called. If no external `src` is supplied through the `props`, the `onload` handler of the element is called asynchronously. When the returned Observable completes, the inserted HTMLScriptElement is removed.

`Example`

Insert an HTMLScriptElement:

```
import { Kernel } from '@sgrud/core';

new Kernel().script({
  src: '/node_modules/module/bundle.js',
  type: 'text/javascript'
}).subscribe();
```

`Signature`

```
script(props): Observable<void>
```

`Returns`

An Observable of the HTMLScriptElements `onload`.

`Parameters`

Name	Type	Description
`props`	`Partial<HTMLScriptElement>`	Any properties to apply to the HTMLScriptElement.

Source

packages/core/src/kernel/kernel.ts:498

core.Kernel.**verify** *(Method)*

Inserts an HTMLLinkElement and applies the supplied `props` to it. This method is used to **verify** a Module bundle before importing and executing it by **verify**ing its Digest.

Example

verify a Module by Digest:

```
import { Kernel } from '@sgrud/core';

new Kernel().verify({
  href: '/node_modules/module/index.js',
  integrity: 'sha256-[...]',
  rel: 'modulepreload'
}).subscribe();
```

Signature

```
verify(props): Observable<void>
```

Returns

An Observable of the appendage and removal of the element.

Parameters

Name	Type	Description
`props`	`Partial<HTMLLinkElement>`	Any properties to apply to the HTMLLinkElement.

Source

packages/core/src/kernel/kernel.ts:539

core.Kernel.**changes** *(Private Readonly Property)*

Internal ReplaySubject tracking the loading state and therefore **changes** of loaded Modules. An Observable form of this internal ReplaySubject may be retrieved by invoking the well-known `Symbol.observable` method and subscribing to the returned Subscribable. The internal **changes** ReplaySubject emits all Module definitions loaded throughout the lifespan of this class.

Source

packages/core/src/kernel/kernel.ts:170

core.Kernel.**imports** *(Private Readonly Property)*

Internal Mapping to keep track of all via `importmap`s declared Module identifiers to their corresponding paths. This map is used for housekeeping, e.g., to prevent the same Module identifier to be defined multiple times.

Source

packages/core/src/kernel/kernel.ts:178

core.Kernel.**loaders** *(Private Readonly Property)*

Internal Mapping of all Modules **loaders** to a ReplaySubject. This ReplaySubject tracks the loading process as such, that it emits the Module definition once the respective Module is fully loaded (including dependencies etc.) and then completes.

Source

packages/core/src/kernel/kernel.ts:187

core.Kernel.**shimmed** *(Private Readonly Property)*

Internally used string to suffix the `importmap` and `module` types of HTMLScriptElements with, if applicable. This string is set to whatever trails the type of HTMLScriptElements encountered upon initialization, iff their type starts with `importmap`.

Source

packages/core/src/kernel/kernel.ts:195

core.**Kernel** *(Namespace)*

The **Kernel** namespace contains types and interfaces used and intended to be used in conjunction with the Singleton Kernel class.

See

Kernel

Source

packages/core/src/kernel/kernel.ts:16, packages/core/src/kernel/kernel.ts:159

core.Kernel.**Digest** *(Type alias)*

String literal helper type. Enforces any assigned string to represent a browser-parsable **Digest** hash. A **Digest** hash is used to represent a hash for Subresource Integrity validation.

Example

A valid **Digest**:

```
import { type Kernel } from '@sgrud/core';

const digest: Kernel.Digest = 'sha256-[...]';
```

Source

packages/core/src/kernel/kernel.ts:31

core.Kernel.**Module** *(Interface)*

Interface describing the shape of a **Module** while being aligned with well-known `package.json` fields. This interface additionally specifies optional `sgrudDependencies` and `webDependencies` mappings, which both are used by the Kernel to determine SGRUD module dependencies and runtime dependencies.

Example

An exemplary **Module** definition:

```
import { type Kernel } from '@sgrud/core';

const module: Kernel.Module = {
  name: 'module',
  version: '0.0.0',
  exports: './module.exports.js',
  unpkg: './module.unpkg.js',
  sgrudDependencies: {
```

```
    sgrudDependency: '^0.0.1'
  },
  webDependencies: {
    webDependency: {
      exports: {
        webDependency: './webDependency.exports.js'
      },
      unpkg: [
        './webDependency.unpkg.js'
      ]
    }
  }
};
```

Source

packages/core/src/kernel/kernel.ts:66

core.Kernel.Module.**digest** *(Optional Readonly Property)*

Optional bundle Digests. If hashes are supplied, they will be used to verify the Subresource Integrity of the respective bundles.

Source

packages/core/src/kernel/kernel.ts:94

core.Kernel.Module.**exports** *(Optional Readonly Property)*

Optional ESM entry point.

Source

packages/core/src/kernel/kernel.ts:82

core.Kernel.Module.**name** *(Readonly Property)*

The **name** of the Module.

Source

packages/core/src/kernel/kernel.ts:71

core.Kernel.Module.**sgrudDependencies** *(Optional Readonly Property)*

Optional SGRUD Module dependencies.

Source

packages/core/src/kernel/kernel.ts:99

core.Kernel.Module.**unpkg** *(Optional Readonly Property)*

Optional UMD entry point.

Source

packages/core/src/kernel/kernel.ts:87

core.Kernel.Module.**version** *(Readonly Property)*

The Module version, formatted as according to the semver specifications.

Source

packages/core/src/kernel/kernel.ts:77

core.Kernel.Module.**webDependencies** *(Optional Readonly Property)*

Optional WebDependency mapping.

Source

packages/core/src/kernel/kernel.ts:104

core.Kernel.**WebDependency** *(Interface)*

Interface describing runtime dependencies of a Module. A Module may specify an array of UMD bundles to be loaded by the Kernel through the `unpkg` property. A Module may also specify a mapping of `import` specifiers to Module-relative paths through the `exports` property. Every specified **WebDependency** is loaded before respective bundles of the Module, which depends on the specified **WebDependency**, will be loaded themselves.

Example

An exemplary **webDependency** definition:

```
import { type Kernel } from '@sgrud/core';

const webDependency: Kernel.WebDependency = {
  exports: {
    webDependency: './webDependency.exports.js'
  },
  unpkg: [
    './webDependency.unpkg.js'
  ]
};
```

Source

packages/core/src/kernel/kernel.ts:132

core.Kernel.WebDependency.**exports** *(Optional Readonly Property)*

Optional ESM runtime dependencies.

Source

packages/core/src/kernel/kernel.ts:137

core.Kernel.WebDependency.**unpkg** *(Optional Readonly Property)*

Optional UMD runtime dependencies.

Source

packages/core/src/kernel/kernel.ts:142

core.**Linker** *(Class)*

The Singleton **Linker** class provides the means to lookup and retrieve instances of Targeted constructors. The **Linker** is used throughout the SGRUD client libraries, e.g., by the Factor decorator, to provide and retrieve different centrally provisioned class instances.

Decorator

Singleton

Example

Preemptively link an instance:

```
import { Linker } from '@sgrud/core';
import { Service } from './service';

new Linker<typeof Service>([
  [Service, new Service('linked')]
]);
```

Type parameters

Name	Type	Description
K	extends () => V	The Targeted constructor type.
V	InstanceType<K>	The Targeted InstanceType.

Hierarchy

- Map<K, V>
  - **Linker**

Source

packages/core/src/linker/linker.ts:35

core.Linker.**constructor** *(Constructor)*

Signature

```
new Linker<K, V>(entries?)
```

Type parameters

Name	Type
K	extends () => V
V	InstanceType<K>

Parameters

Name	Type
entries?	null | readonly readonly [K, V][]

Signature

```
new Linker<K, V>(iterable?)
```

Type parameters

Name	Type
K	extends () => V
V	InstanceType<K>

Parameters

Name	Type
iterable?	null | Iterable<readonly [K, V]>

Source

node_modules/typescript/lib/lib.es2015.collection.d.ts:50, node_modules/typescript/lib/lib.es2015.collection.d.ts:51

core.Linker.**get** *(Method)*

Overridden **get** method. Calling this method looks up the linked instance based on the supplied `target` constructor. If no linked instance is found, one is created by calling the `new` operator on the `target` constructor. Therefor the `target` constructors must not require parameters.

Example

Retrieve a linked instance:

```
import { Linker } from '@sgrud/core';
import { Service } from './service';

new Linker<typeof Service>().get(Service);
```

Signature

```
get(target): V
```

Returns

The already linked or a newly constructed and linked instance.

Parameters

Name	Type	Description
`target`	`K`	The `target` constructor for which to retrieve an instance.

Source

packages/core/src/linker/linker.ts:58

core.Linker.**getAll** *(Method)*

The **getAll** method returns all linked instances, which satisfy `instanceof target`. Use this method when multiple linked `target` constructors extend the same base class and are to be retrieved.

Example

Retrieve all linked instances of a `Service`:

```
import { Linker } from '@sgrud/core';
import { Service } from './service';

new Linker<typeof Service>().getAll(Service);
```

Signature

```
getAll(target): V[]
```

Returns

All already linked instance of the `target` constructor.

Parameters

Name	Type	Description
`target`	`K`	The `target` constructor for which to retrieve instances.

Source

packages/core/src/linker/linker.ts:85

core.**Merge** *(Type alias)*

Type helper to convert union types (`A | B`) to intersection types (`A & B`).

`Remarks`

https://github.com/microsoft/TypeScript/issues/29594

`Type parameters`

Name	Description
`T`	The union type to **Merge**.

`Source`

packages/core/src/typing/merge.ts:8

core.**Mutable** *(Type alias)*

Type helper marking the supplied type as **Mutable** (opposed to `readonly`).

`Remarks`

https://github.com/Microsoft/TypeScript/issues/24509

`Type parameters`

Name	Type	Description
`T`	extends `object`	The readonly type to make **Mutable**.

`Source`

packages/core/src/typing/mutable.ts:8

core.**Provide** *(Type alias)*

Type helper enforcing the provide symbol property to contain a magic string (typed as Registration) on base constructors decorated with the corresponding Provide decorator. The **Provide** type helper is also used by the Provider decorator.

`See`

Provide

`Type parameters`

Name	Type	Description
`K`	extends `Registration`	The magic string Registration type.
`V`	extends (...`args`: `any`[]) => `InstanceType`<`V`>	The registered class constructor type.

`Source`

packages/core/src/super/provide.ts:61, packages/core/src/super/provide.ts:19

core.**Provide** *(Function)*

Class decorator factory. **Provide**s the decorated class to extending classes. Applying the **Provide** decorator enforces the Provide type which entails the declaration of a static provide property typed as Registration. The magic string assigned to this static property is used by the Provider factory function to get base classes from the Registry.

Example

Provide a base class:

```
import { Provide, provide } from '@sgrud/core';

@Provide()
export abstract class Base {

  public static readonly [provide] = 'sgrud.example.Base' as const;

}
```

See

Provider, Registry

Signature

```
Provide<V, K>(): (constructor: V) => void
```

Returns

A class constructor decorator.

Type parameters

Name	Type	Description
V	extends Provide<K, V>	The registered class constructor type.
K	extends Registration = V[typeof provide]	The magic string Registration type.

Source

packages/core/src/super/provide.ts:61, packages/core/src/super/provide.ts:19

core.**Provider** *(Function)*

Provider of base classes. Extending this mixin-style function while supplying the `typeof` a Provided constructor enforces type safety and hinting on the supplied magic string and the resulting class which `extends` this **Provider** mixin. The main purpose of this pattern is bridging module gaps by de-coupling bundle files while maintaining a well-defined prototype chain. This still requires the base class to be defined (and Provided) before extension but allows intellisense'd OOP patterns across multiple modules while maintaining runtime language specifications.

Example

Extend a provided class:

```
import { Provider } from '@sgrud/core';
import { type Base } from 'example-module';

export class Class
  extends Provider<typeof Base>('sgrud.example.Base') {

  public constructor(...args: any[]) {
    super(...args);
  }

}
```

See

Provide, Registry

Signature

```
Provider<V, K>(provider): V
```

Returns

The constructor which Provides the Registration.

Type parameters

Name	Type	Description
V	extends Provide<K, V>	The registered class constructor type.
K	extends Registration = V[typeof provide]	The magic string Registration type.

Parameters

Name	Type	Description
provider	K	A magic string to retrieve the provider by.

Source

packages/core/src/super/provider.ts:64, packages/core/src/super/provider.ts:13

core.**Provider** *(Interface)*

Type helper to allow referencing Provided constructors as new-able targets. Used and intended to be used in conjunction with the Provider decorator.

See

Provider

Type parameters

Name	Description
V	Instance type of the registered class constructor.

Source

packages/core/src/super/provider.ts:64, packages/core/src/super/provider.ts:13

core.Provider.**[provide]** *(Readonly Property)*

Enforced provider contract.

Source

packages/core/src/super/provider.ts:18

core.Provider.**constructor** *(Constructor)*

core.Provider.**constructor** *(Constructor)*

Enforced constructor contract.

Signature

```
new Provider(...args)
```

Parameters

Name	Type	Description
...args	any[]	The default class constructor rest parameter.

Source

packages/core/src/super/provider.ts:64, packages/core/src/super/provider.ts:13

core.**Proxy** *(Abstract Class)*

Abstract **Proxy** base class to implement Request interceptors, on the client side. By extending this abstract base class and providing the extending class to the Linker, e.g., by Targeting it, the class's handle method will be called with the Request details (which could have been modified by a previous **Proxy**) and the next Handler, whenever a request is fired through the Http class.

Decorator

Provide

Example

Simple **Proxy** intercepting `file:` requests:

```
import { type Http, Provider, type Proxy, Target } from '@sgrud/core';
import { type Observable, of } from 'rxjs';
import { file } from './file';

@Target()
export class FileProxy
  extends Provider<typeof Proxy>('sgrud.core.Proxy') {

  public override handle(
    request: Http.Request,
    handler: Http.Handler
  ): Observable<Http.Response> {
    if (request.url.startsWith('file:')) {
      return of<Http.Response>(file);
    }

    return handler.handle(request);
  }

}
```

See

Http

Hierarchy

- **Proxy**
  - Transit

Source

packages/core/src/http/proxy.ts:44

core.Proxy.**[provide]** *(Static Readonly Property)*

Magic string by which this class is provided.

See

provide

Source

packages/core/src/http/proxy.ts:51

core.Proxy.**constructor** *(Constructor)*

Signature

```
new Proxy()
```

core.Proxy.**handle** *(Abstract Method)*

The **handle** method of linked classes extending the Proxy base class is called whenever an Request is fired. The extending class can either pass the `request` to the next `handler`, with or without modifying it, or an interceptor can chose to completely handle a `request` by itself through returning an Observable Response.

Signature

```
handle(request, handler): Observable<Response<any>>
```

Returns

An Observable of the **handle**d Response.

Parameters

Name	Type	Description
`request`	`Request`	The Request to be **handle**d.
`handler`	`Handler`	The next Handler to **handle** the `request`.

Source

packages/core/src/http/proxy.ts:64

core.**Registration** *(Type alias)*

String literal helper type. Enforces any assigned string to contain at least three dots. **Registration**s are used by the Registry to alias classes extending the base Provider as magic strings and should represent sane module paths in dot-notation.

Example

Library-wide **Registration** pattern:

```
import { type Registration } from '@sgrud/core';

const registration: Registration = 'sgrud.module.ClassName';
```

See

Registry

Source

packages/core/src/super/registry.ts:20

core.**Registry** *(Class)*

The Singleton **Registry** is a mapping used by the Provider to lookup Provided constructors by Registrations upon class extension. Magic strings should represent sane module paths in dot-notation. Whenever a currently not registered constructor is requested, an intermediary class is created, cached internally and returned. When the actual constructor is registered later, the previously created intermediary class is removed from the internal caching and further steps are taken to guarantee the transparent addressing of the actual constructor through the dropped intermediary class.

Decorator

Singleton

See

Provide, Provider

Type parameters

Name	Type	Description
K	extends Registration	The magic string Registration type.
V	extends (...args: any[]) => InstanceType<V>	The registered class constructor type.

Hierarchy

- Map<K, V>
  - **Registry**

Source

packages/core/src/super/registry.ts:49

core.Registry.**constructor** *(Constructor)*

Public **constructor**. The constructor of this class accepts the same parameters as its overridden `super` Map **constructor** and acts the same. I.e., through instantiating this Singleton class and passing a list of `tuples` of Registrations and their corresponding class constructors, these tuples may be preemptively registered.

Example

Preemptively provide a class constructor by magic string:

```
import { type Registration, Registry } from '@sgrud/core';
import { Service } from './service';

const registration = 'sgrud.example.Service';
new Registry<Registration, typeof Service>([
  [registration, Service]
]);
```

Signature

```
new Registry<K, V>(tuples?)
```

Type parameters

Name	Type
K	extends Registration
V	extends (...args: any[]) => InstanceType<V>

Parameters

Name	Type	Description
tuples?	Iterable<[K, V]>	An Iterable of `tuples` provide.

Source

packages/core/src/super/registry.ts:94

core.Registry.**get** *(Method)*

Overridden **get** method. Looks up the Provided constructor by magic string. If no provided constructor is found, an intermediary class is created, cached internally and returned. While this intermediary class and the functionality supporting it take care of inheritance, i.e., allow

forward-referenced base classes to be extended, it cannot substitute for the actual extended constructor. Therefore, the static extension of forward-referenced classes is possible, but as long as the actual extended constructor is not registered (and therefore the intermediary class still caches the inheritance chain), the extending classes cannot be instantiated, called etc. Doing so will result in a ReferenceError being thrown.

Throws

A ReferenceError when a cached class is invoked.

Example

Retrieve a provided constructor by magic string:

```
import { type Registration, Registry } from '@sgrud/core';
import { type Service } from 'example-module';

const registration = 'sgrud.example.Service';
new Registry<Registration, typeof Service>().get(registration);
```

Signature

```
get(registration): V
```

Returns

The Provided constructor or a cached intermediary.

Parameters

Name	Type	Description
`registration`	`K`	The magic string to **get** the class constructor by.

Source

packages/core/src/super/registry.ts:134

core.Registry.**set** *(Method)*

Overridden **set** method. Whenever a class constructor is provided by magic string through calling this method, a test is run, whether this constructor was previously requested and therefore cached as intermediary class. If so, the intermediary class is removed from the internal mapping and further steps are taken to guarantee the transparent addressing of the newly provided constructor through the previously cached and now dropped intermediary class.

Example

Preemptively provide a constructor by magic string:

```
import { type Registration, Registry } from '@sgrud/core';
import { Service } from './service';

const registration = 'sgrud.example.Service';
new Registry<Registration, typeof Service>().set(registration, Service);
```

Signature

```
set(registration, constructor): Registry<K, V>
```

Returns

This Registry instance.

Parameters

Name	Type	Description
`registration`	`K`	The magic string to **set** the class constructor by.
`constructor`	`V`	The `constructor` to register for the `registration`.

Source

packages/core/src/super/registry.ts:186

core.Registry.**cached** *(Private Readonly Property)*

Internal Mapping of all **cached**, i.e., forward-referenced, class constructors. Whenever a constructor, which is not currently registered, is requested as a Provider, an intermediary class is created and stored within this map until the actual constructor is registered. As soon as this happens, the intermediary class is removed from this map and further steps are taken to guarantee the transparent addressing of the actual constructor through the dropped intermediary class.

Source

packages/core/src/super/registry.ts:63

core.Registry.**caches** *(Private Readonly Property)*

Internally used WeakSet containing all intermediary classes created upon requesting a currently not registered constructor as provider. This set is used internally to check if a intermediary class has already been replaced by the actual constructor.

Source

packages/core/src/super/registry.ts:71

core.**Singleton** *(Function)*

Class decorator factory. Enforces a transparent **Singleton** pattern on the decorated class. When calling the `new` operator on a decorated class for the first time, an instance of the decorated class is created using the supplied arguments, if any. This instance will remain the **Singleton** instance of the decorated class indefinitely. When calling the `new` operator on a decorated class already instantiated, the **Singleton** pattern is enforced and the previously constructed instance is returned. Instead, if provided, the `apply` callback is fired with the **Singleton** instance and the `new` invocation parameters.

Example

Singleton class:

```
import { Singleton } from '@sgrud/core';

@Singleton()
export class Service {}

new Service() === new Service(); // true
```

Signature

```
Singleton<T>(apply?): (constructor: T) => T
```

Returns

A class constructor decorator.

Type parameters

Name	Type	Description
`T`	extends (…`args`: `any`[]) => `any`	The type of the decorated constructor.

Parameters

Name	Type	Description
`apply?`	(`self`: `InstanceType`<`T`>, `args`: `ConstructorParameters`<`T`>) => `InstanceType`<`T`>	The callback to `apply` on subsequent `new` invocations.

Source

packages/core/src/utility/singleton.ts:27

core.**Spawn** *(Function)*

This prototype property decorator factory **Spawn**s a Worker and wraps and assigns the resulting Remote to the decorated prototype property.

Example

Spawn a Worker:

```
import { Spawn, type Thread } from '@sgrud/core';
import { type ExampleWorker } from 'example-worker';

export class ExampleWorkerHandler {

  @Spawn('example-worker')
  public readonly worker!: Thread<ExampleWorker>;

}
```

See

Thread

Signature

```
Spawn(worker, source?): (prototype: object, propertyKey: PropertyKey) => void
```

Returns

A prototype property decorator.

Parameters

Name	Type	Description
`worker`	`string` | `Endpoint` | `NodeEndpoint`	The `worker` module name or Endpoint to **Spawn**.
`source?`	`string`	An optional Module `source`.

Source

packages/core/src/thread/spawn.ts:32

core.**Symbol** *(Function)*

Proxy around the built-in Symbol object, returning the requested symbol or the name of the requested symbol prefixed with `'@@'`.

Signature

```
Symbol(description?): symbol
```

Parameters

Name	Type
`description?`	`string` | `number`

Source

packages/core/src/utility/symbols.ts:5

core.**Target** *(Type alias)*

`Type parameters`

Name	Description
V	The **Target**ed InstanceType.

`Type declaration`

Type helper to allow Factoring **Target**ed constructors with required arguments. Used and to be used in conjunction with the Target decorator.

`Signature`

```
(...args)
```

`Parameters`

Name	Type
`...args`	`any[]`

`Source`

packages/core/src/linker/target.ts:56, packages/core/src/linker/target.ts:10

core.**Target** *(Function)*

Class decorator factory. Links the **Target**ed constructor to its corresponding instance by applying the supplied `factoryArgs`. Employ this helper to link **Target**ed constructors with required arguments. Supplying a `target` constructor overrides its linked instance, if any, with the constructed instance.

`Example`

Target a service:

```
import { Target } from '@sgrud/core';

@Target(['default'])
export class Service {

  public constructor(
    public readonly param: string
  ) {}

}
```

`Example`

Factor a **Target**ed service:

```
import { Factor, type Target } from '@sgrud/core';
import { Service } from './service';

export class ServiceHandler {

  @Factor<Target<Service>>(() => Service)
  public readonly service!: Service;

}
```

`See`

Factor, Linker

`Signature`

```
Target<K>(factoryArgs?, target?): (constructor: K) => void
```

Returns

A class constructor decorator.

Type parameters

Name	Type	Description
`K`	extends (…`args`: `any`[]) => `any`	The **Target**ed constructor type.

Parameters

Name	Type	Description
`factoryArgs?`	`ConstructorParameters<K>`	The arguments for the **Target**ed constructor.
`target?`	`K`	An optional **Target** constructor to override.

Source

packages/core/src/linker/target.ts:56, packages/core/src/linker/target.ts:10

core.**Thread** *(Type alias)*

Type alias describing an exposed class in a remote context. Represented by wrapping a Remote in a Promise. Used and intended to be used in conjunction with the Thread decorator.

See

Thread

Type parameters

Name	Description
`T`	The Remote **Thread** type.

Source

packages/core/src/thread/thread.ts:32, packages/core/src/thread/thread.ts:13

core.**Thread** *(Function)*

Class decorator factory. exposes an instance of the decorated class as Worker **Thread**.

Example

ExampleWorker **Thread**:

```
import { Thread } from '@sgrud/core';

@Thread()
export class ExampleWorker {}
```

See

Spawn

Signature

```
Thread(): (constructor: () => any) => void
```

Returns

A class constructor decorator.

Source

packages/core/src/thread/thread.ts:32, packages/core/src/thread/thread.ts:13

core.**Transit** *(Class)*

The Targeted Singleton **Transit** class is a built-in Proxy intercepting all connections opened by the Http class. This Proxy implements the `Symbol.observable` pattern, through which it emits an array of all currently open Requests every time a new Request is fired or a previously fired Request completes.

Decorator

Target, Singleton

See

Http, Proxy

Hierarchy

- `Proxy<this>`
  - **Transit**

Source

packages/core/src/http/transit.ts:26

core.Transit.**[provide]** *(Static Readonly Property)*

Magic string by which this class is provided.

See

provide

Source

packages/core/src/http/proxy.ts:51

core.Transit.**[observable]** *(Method)*

Well-known `Symbol.observable` method returning a Subscribable. The returned Subscribable emits all active Requests in an array, whenever this list changes. Using the returned Subscribable, e.g., a load indicator can easily be implemented.

Example

Subscribe to the currently active Request:

```
import { Transit, Linker } from '@sgrud/core';
import { from } from 'rxjs';

const transit = new Linker<typeof Transit>().get(Transit);
from(transit).subscribe(console.log);
```

Signature

```
[observable](): Subscribable<Response<any>[]>
```

Returns

A Subscribable emitting all active Request.

Source

packages/core/src/http/transit.ts:70

core.Transit.**constructor** *(Constructor)*

Public **constructor**. Called by the Target decorator to link this Proxy so it may be used by the Http class.

Signature

```
new Transit()
```

Source

packages/core/src/http/transit.ts:45

core.Transit.**handle** *(Method)*

Overridden **handle** method of the Proxy base class. Mutates the `request` to also emit progress events while it is running. These progress events will be consumed by the Transit interceptor and re-supplied via the Subscribable returned by the `Symbol.observable` method.

Signature

```
handle(request, handler): Observable<Response<any>>
```

Returns

An Observable of the **handle**d Response.

Parameters

Name	Type	Description
`request`	`Request`	The Request to be **handle**d.
`handler`	`Handler`	The next Handler to **handle** the `request`.

Source

packages/core/src/http/transit.ts:84

core.Transit.**changes** *(Private Readonly Property)*

The **changes** Subject emits every time a request is added to or deleted from the internal requests mapping.

Source

packages/core/src/http/transit.ts:33

core.Transit.**requests** *(Private Readonly Property)*

Internal Mapping of all running requests. Mutating this map should be accompanied by an emittance of the changes Subject.

Source

packages/core/src/http/transit.ts:39

core.**TypeOf** *(Abstract Class)*

Strict type-assertion and runtime type-checking utility. When type-checking variables in the global scope, e.g., `window` or `process`, make use of the `globalThis` object.

Example

Type-check global context:

```
import { TypeOf } from '@sgrud/core';
```

```
TypeOf.process(globalThis.process); // true if running in node context
TypeOf.window(globalThis.window);   // true if running in browser context
```

Source

packages/core/src/utility/type-of.ts:15

core.TypeOf.**array** *(Static Method)*

Type-check `value` for `unknown[]`.

Example

Type-check `null` for `unknown[]`:

```
import { TypeOf } from '@sgrud/core';

TypeOf.array(null); // false
```

Signature

```
array(value): value is unknown[]
```

Returns

Whether `value` is of type `unknown[]`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:31

core.TypeOf.**boolean** *(Static Method)*

Type-check `value` for `boolean`.

Example

Type-check `null` for `boolean`:

```
import { TypeOf } from '@sgrud/core';

TypeOf.boolean(null); // false
```

Signature

```
boolean(value): value is boolean
```

Returns

Whether `value` is of type `boolean`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:49

core.TypeOf.**date** *(Static Method)*

Type-check `value` for `Date`.

Example

Type-check `null` for `Date`:

```
import { TypeOf } from '@sgrud/core';

TypeOf.date(null); // false
```

Signature

```
date(value): value is Date
```

Returns

Whether `value` is of type `Date`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:67

core.TypeOf.**function** *(Static Method)*

Type-check `value` for `Function`.

Example

Type-check `null` for `Function`:

```
import { TypeOf } from '@sgrud/core';

TypeOf.function(null); // false
```

Signature

```
function(value): value is Function
```

Returns

Whether `value` is of type `Function`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:85

core.TypeOf.**null** *(Static Method)*

Type-check `value` for `null`.

Example

Type-check `null` for `null`:

```ts
import { TypeOf } from '@sgrud/core';

TypeOf.null(null); // true
```

Signature

```ts
null(value): value is null
```

Returns

Whether `value` is of type `null`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:103

core.TypeOf.**number** *(Static Method)*

Type-check `value` for `number`.

Example

Type-check `null` for `number`:

```ts
import { TypeOf } from '@sgrud/core';

TypeOf.number(null); // false
```

Signature

```ts
number(value): value is number
```

Returns

Whether `value` is of type `number`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:121

core.TypeOf.**object** *(Static Method)*

Type-check `value` for `object`.

Example

Type-check `null` for `object`:

```ts
import { TypeOf } from '@sgrud/core';

TypeOf.object(null); // false
```

Signature

```
object(value): value is object
```

Returns

Whether `value` is of type `object`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:139

core.TypeOf.process *(Static Method)*

Type-check `value` for `NodeJS.Process`.

Example

Type-check `null` for `NodeJS.Process`:

```
import { TypeOf } from '@sgrud/core';

TypeOf.process(null); // false
```

Signature

```
process(value): value is Process
```

Returns

Whether `value` is of type `NodeJS.Process`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:157

core.TypeOf.promise *(Static Method)*

Type-check `value` for `Promise<unknown>`.

Example

Type-check `null` for `Promise<unknown>`:

```
import { TypeOf } from '@sgrud/core';

TypeOf.promise(null); // false
```

Signature

```
promise(value): value is Promise<unknown>
```

Returns

Whether `value` is of type `Promise<unknown>`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:175

core.TypeOf.**regex** *(Static Method)*

Type-check `value` for `RegExp`.

Example

Type-check `null` for `RegExp`:

```
import { TypeOf } from '@sgrud/core';

TypeOf.regex(null); // false
```

Signature

```
regex(value): value is RegExp
```

Returns

Whether `value` is of type `RegExp`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:193

core.TypeOf.**string** *(Static Method)*

Type-check `value` for `string`.

Example

Type-check `null` for `string`:

```
import { TypeOf } from '@sgrud/core';

TypeOf.string(null); // false
```

Signature

```
string(value): value is string
```

Returns

Whether `value` is of type `string`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:211

core.TypeOf.**undefined** *(Static Method)*

Type-check `value` for `undefined`.

Example

Type-check `null` for `undefined`:

```
import { TypeOf } from '@sgrud/core';

TypeOf.undefined(null); // false
```

Signature

```
undefined(value): value is undefined
```

Returns

Whether `value` is of type `undefined`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:229

core.TypeOf.**url** *(Static Method)*

Type-check `value` for `URL`.

Example

Type-check `null` for `URL`:

```
import { TypeOf } from '@sgrud/core';

TypeOf.url(null); // false
```

Signature

```
url(value): value is URL
```

Returns

Whether `value` is of type `URL`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:247

core.TypeOf.**window** *(Static Method)*

Type-check `value` for `Window`.

Example

Type-check `null` for `Window`:

```ts
import { TypeOf } from '@sgrud/core';

TypeOf.window(null); // false
```

Signature

```ts
window(value): value is Window
```

Returns

Whether `value` is of type `Window`.

Parameters

Name	Type	Description
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:265

core.TypeOf.**test** *(Static Private Method)*

Type-check `value` for `type`.

Signature

```ts
test(type, value): boolean
```

Returns

Whether `value` is `type`.

Parameters

Name	Type	Description
`type`	`string`	The `type` to check for.
`value`	`unknown`	The `value` to type-check.

Source

packages/core/src/utility/type-of.ts:276

core.TypeOf.**constructor** *(Private Constructor)*

Private **constructor** (which should never be called).

Throws

A TypeError upon construction.

Signature

```ts
new TypeOf()
```

Source

packages/core/src/utility/type-of.ts:285

core.**assign** *(Function)*

assigns (deep copies) the values of all of the enumerable own properties from one or more `sources` to a `target`. The last value within the last `sources` object takes precedence over any previously encountered values.

Example

assign nested properties:

```
import { assign } from '@sgrud/core';

assign(
  { one: { one: true }, two: false },
  { one: { key: null } },
  { two: true }
);

// { one: { one: true, key: null }, two: true }
```

Signature

```
assign<T, S>(target, ...sources): T & Merge<S[number]>
```

Returns

The **assign**ed-to `target` object.

Type parameters

Name	Type	Description
`T`	extends `Record<PropertyKey, any>`	The type of the `target` object.
`S`	extends `Record<PropertyKey, any>[]`	The types of the `sources` objects.

Parameters

Name	Type	Description
`target`	`T`	The `target` object to **assign** properties to.
`...sources`	[…S[]]	An array of `sources` from which to deep copy properties.

Source

packages/core/src/utility/assign.ts:29

core.**pluralize** *(Function)*

pluralizes words of the English language.

Example

Pluralize `'money'`:

```
import { pluralize } from '@sgrud/core';

pluralize('money'); // 'money'
```

Example

Pluralize `'thesis'`:

```
import { pluralize } from '@sgrud/core';

pluralize('thesis'); // 'theses'
```

Signature

```
pluralize(singular): string
```

Returns

The **pluralize**d form of `singular`.

Parameters

Name	Type	Description
`singular`	`string`	An English word in `singular` form.

Source

packages/core/src/utility/pluralize.ts:23

core.**provide** *(Const Variable)*

Unique symbol used as property key by the Provide type constraint.

Source

packages/core/src/super/provide.ts:6

core.**semver** *(Function)*

Best-effort **semver** matcher. The supplied `version` will be tested against the supplied `range`.

Example

Test `'1.2.3'` against `'>2 <1 || ~1.2.*'`:

```
import { semver } from '@sgrud/core';

semver('1.2.3', '>2 <1 || ~1.2.*'); // true
```

Example

Test `'1.2.3'` against `'~1.1'`:

```
import { semver } from '@sgrud/core';

semver('1.2.3', '~1.1'); // false
```

Signature

```
semver(version, range): boolean
```

Returns

Whether `version` satisfies `range`.

Parameters

Name	Type	Description
`version`	`string`	The to-be tested semantic `version` string.
`range`	`string`	The `range` to test the `version` against.

Source

packages/core/src/kernel/semver.ts:25

data Module

`@sgrud/data` - The SGRUD Data Model.

The functions and classes found within the **`@sgrud/data`** module are intended to ease the type safe data handling, i.e., retrieval, mutation and storage, within applications built upon the SGRUD client libraries. By extending the Model class and applying adequate decorators to the contained properties, the resulting extension will, in its static context, provide all necessary means to interact directly with the underlying repository, while the instance context of any class extending the abstract Model base class will inherit methods to observe changes to its instance field values, selectively complement the instance with fields from the backing data storage via type safe graph representations and to delete the respective instance from the data storage.

`Source`

packages/data/index.ts:1

data.**Enum** *(Abstract Class)*

Abstract **Enum** helper class. This class is used by the Model to detect **Enum**erations within a Graph, as **Enum**erations (in contrast to plain strings) must not be quoted. This class should never be instantiated manually, but instead is used internally by the the enumerate function.

`See`

enumerate

`Hierarchy`

- `String`
  - **`Enum`**

`Source`

packages/data/src/model/enum.ts:10

data.Enum.**constructor** *(Private Constructor)*

Private **constructor** (which should never be called).

`Throws`

A TypeError upon construction.

`Signature`

```
new Enum()
```

`Source`

packages/data/src/model/enum.ts:18

data.**HasMany** *(Function)*

Model field decorator factory. Using this decorator, Models can be enriched with one-to-many associations to other Models. The value for the `typeFactory` argument has to be another Model. By applying this decorator, the decorated field will (depending on the `transient` argument value) be taken into account when serializing or treemapping the Model containing the decorated field.

`Example`

Model with a one-to-many association:

```
import { HasMany, Model } from '@sgrud/data';
import { OwnedModel } from './owned-model';

export class ExampleModel extends Model<ExampleModel> {

  @HasMany(() => OwnedModel)
  public field?: OwnedModel[];

  protected [Symbol.toStringTag]: string = 'ExampleModel';
```

}

See

Model, HasOne, Property

Signature

```
HasMany<T>(typeFactory, transient?): <M>(model: M, field: Field<M>) => void
```

Returns

A Model field decorator.

Type parameters

Name	Type	Description
`T`	extends `Type<Model<any>, T>`	The field value constructor type.

Parameters

Name	Type	Default value	Description
`typeFactory`	() => `T`	`undefined`	A forward reference to the field value constructor.
`transient`	`boolean`	`false`	Whether the decorated field is `transient`.

Source

packages/data/src/relation/has-many.ts:46

data.**HasOne** *(Function)*

Model field decorator factory. Using this decorator, Models can be enriched with one-to-one associations to other Models. The value for the `typeFactory` argument has to be another Model. By applying this decorator, the decorated field will (depending on the `transient` argument value) be taken into account when serializing or treemapping the Model containing the decorated field.

Example

Model with a one-to-one association:

```
import { HasOne, Model } from '@sgrud/data';
import { OwnedModel } from './owned-model';

export class ExampleModel extends Model<ExampleModel> {

  @HasOne(() => OwnedModel)
  public field?: OwnedModel;

  protected [Symbol.toStringTag]: string = 'ExampleModel';

}
```

See

Model, HasMany, Property

Signature

```
HasOne<T>(typeFactory, transient?): <M>(model: M, field: Field<M>) => void
```

Returns

A Model field decorator.

Type parameters

Name	Type	Description
`T`	extends `Type<Model<any>, T>`	The field value constructor type.

`Parameters`

Name	Type	Default value	Description
`typeFactory`	() => `T`	`undefined`	A forward reference to the field value constructor.
`transient`	`boolean`	`false`	Whether the decorated field is `transient`.

`Source`

packages/data/src/relation/has-one.ts:46

data.**HttpQuerier** *(Class)*

The **HttpQuerier** class implements an Http based Querier, i.e., an extension of the abstract Querier base class, allowing for Model queries to be executed via HTTP. To use this class, provide it to the Linker by either extending it, and decorating the extending class with the Target decorator, or by preemptively supplying an instance of this class to the Linker.

`Example`

Provide the **HttpQuerier** to the Linker:

```
import { Linker } from '@sgrud/core';
import { HttpQuerier } from '@sgrud/data';

new Linker<typeof HttpQuerier>([
  [HttpQuerier, new HttpQuerier('https://api.example.com')]
]);
```

`See`

Model, Querier

`Hierarchy`

- `Querier<this>`
  - **`HttpQuerier`**

`Source`

packages/data/src/querier/http.ts:28

data.HttpQuerier.**[provide]** *(Static Readonly Property)*

Magic string by which this class is provided.

`See`

provide

`Source`

packages/data/src/querier/querier.ts:96

data.HttpQuerier.**commit** *(Method)*

Overridden **commit** method of the Querier base class. When this Querier is made available via the Linker, this overridden **commit** method is called when this Querier claims the highest priority to **commit** an Operation, depending on the Model from which the Operation originates.

Throws

An Observable of an AggregateError.

Signature

```
commit(operation, variables?): Observable<unknown>
```

Returns

An Observable of the committed Operation.

Parameters

Name	Type	Description
`operation`	`Operation`	The Operation to be **commit**ted.
`variables?`	`Variables`	Any Variables within the `operation`.

Source

packages/data/src/querier/http.ts:82

data.HttpQuerier.**constructor** *(Constructor)*

Public **constructor** consuming the HTTP `endpoint` Model queries should be committed against, and an dynamic or static `prioritize` value. The `prioritize` value may either be a mapping of Models to corresponding priorities or a static priority for this Querier.

Signature

```
new HttpQuerier(endpoint, prioritize?)
```

Parameters

Name	Type	Default value	Description
`endpoint`	`string`	`undefined`	The HTTP `endpoint` to commit queries against.
`prioritize`	`number | Map<Type<Model<any>>, number>`	`0`	The dynamic or static prioritization.

Source

packages/data/src/querier/http.ts:50

data.HttpQuerier.**priority** *(Method)*

Overridden **priority** method of the Querier base class. When an Operation is to be committed, this method is called with the respective `model` Type and returns the claimed **priority** to commit this Model.

Signature

```
priority(model): number
```

Returns

The numeric **priority** of this Querier implementation.

Parameters

Name	Type	Description
`model`	`Type<Model<any>>`	The Model to be committed.

Source

packages/data/src/querier/http.ts:108

data.HttpQuerier.**types** *(Readonly Property)*

A set containing the Types this Querier can handle. As HTTP connections are short-lived, the HttpQuerier may only handle one-off **types**, namely `'mutation'` and `'query'`.

Source

packages/data/src/querier/http.ts:36

data.HttpQuerier.**endpoint** *(Private Readonly Property)*

The HTTP `endpoint` to commit queries against.

Source

packages/data/src/querier/http.ts:55

data.HttpQuerier.**prioritize** *(Private Readonly Property)*

The dynamic or static prioritization.

See

priority

Source

packages/data/src/querier/http.ts:64

data.**Model** *(Abstract Class)*

Abstract base class to implement data **Model**s. By extending this abstract base class while providing the `Symbol.toStringTag` property containing the singular name of the resulting data **Model**, type safe data handling, i.e., retrieval, mutation and storage, can easily be achieved. Through the use of the static- and instance-scoped polymorphic `this`, all inherited operations warrant type safety and provide intellisense.

Example

Extend the **Model** base class:

```
import { Model, Property } from '@sgrud/data';

export class ExampleModel extends Model<ExampleModel> {

  @Property(() => String)
  public field: string?;

  protected [Symbol.toStringTag]: string = 'ExampleModel';

}
```

See

Querier

Type parameters

Name	Type	Description
`M`	extends `Model` = `any`	The extending **Model** InstanceType.

Source

packages/data/src/model/model.ts:18, packages/data/src/model/model.ts:126, packages/data/src/model/model.ts:323

data.Model.**commit** *(Static Method)*

Static **commit** method. Calling this method on a class extending the abstract Model base class, while supplying an `operation` and all its embedded `variables`, will dispatch the Operation to the respective Model repository through the highest priority Querier or, if no Querier is compatible, an error is thrown. This method is the entry point for all Model-related data transferral and is internally called by all other distinct methods of the Model.

Throws

An Observable ReferenceError on incompatibility.

Example

commit a `query`-type operation:

```
import { ExampleModel } from './example-model';

ExampleModel.commit(`query queryExample(variable: $variable) {
  result {
    field
  }
}`, {
  variable: 'value'
}).subscribe(console.log);
```

Signature

```
commit<T>(this, operation, variables?): Observable<unknown>
```

Returns

An Observable of the **commit**med `operation`.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`operation`	`Operation`	The Operation to be **commit**ted.
`variables?`	`Variables`	Any Variables within the `operation`.

Source

packages/data/src/model/model.ts:357

data.Model.**deleteAll** *(Static Method)*

Static **deleteAll** method. Calling this method on a class extending the Model, while supplying an array of `uuids`, will dispatch the deletion of all Model instances identified by these UUIDs to the respective Model repository by internally calling commit with suitable arguments. Through this method, bulk-deletions from the respective Model repository can be achieved.

Example

Drop all model instances by UUIDs:

```
import { ExampleModel } from './example-model';
```

```
ExampleModel.deleteAll([
  'b050d63f-cede-46dd-8634-a80d0563ead8',
  'a0164132-cd9b-4859-927e-ba68bc20c0ae',
  'b3fca31e-95cd-453a-93ae-969d3b120712'
]).subscribe(console.log);
```

Signature

```
deleteAll<T>(this, uuids): Observable<unknown>
```

Returns

An Observable of the deletion.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`uuids`	`string[]`	An array of `uuids` of Models to be deleted.

Source

packages/data/src/model/model.ts:410

data.Model.**deleteOne** *(Static Method)*

Static **deleteOne** method. Calling this method on a class extending the Model, while supplying an `uuid`, will dispatch the deletion of the Model instance identified by this UUID to the respective repository by internally calling the commit operation with suitable arguments. Through this method, the deletion of a single Model instance from the respective Model repository can be achieved.

Example

Drop one model instance by UUID:

```
import { ExampleModel } from './example-model';

ExampleModel.deleteOne(
  '18f3aa99-afa5-40f4-90c2-71a2ecc25651'
).subscribe(console.log);
```

Signature

```
deleteOne<T>(this, uuid): Observable<unknown>
```

Returns

An Observable of the deletion.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.

Name	Type	Description
`uuid`	`string`	The `uuid` of the Model instance to be deleted.

`Source`

packages/data/src/model/model.ts:444

data.Model.**findAll** *(Static Method)*

Static **findAll** method. Calling this method on a class extending the abstract Model base class, while supplying a `filter` to match Model instances by and a `graph` containing the fields to be included in the result, will dispatch a lookup operation to the respective repository by internally calling the commit operation with suitable arguments. Through this method, the bulk-lookup of Model instances from the respective Model repository can be achieved.

`Example`

Lookup all UUIDs for model instances modified between two dates:

```
import { ExampleModel } from './example-model';

ExampleModel.findAll({
  expression: {
    conjunction: {
      operands: [
        {
          entity: {
            operator: 'GREATER_OR_EQUAL',
            path: 'modified',
            value: new Date('2021-01-01')
          }
        },
        {
          entity: {
            operator: 'LESS_OR_EQUAL',
            path: 'modified',
            value: new Date('2021-12-12')
          }
        }
      ],
      operator: 'AND'
    }
  }
}, [
  'uuid',
  'field'
]).subscribe(console.log);
```

`Signature`

```
findAll<T>(this, filter, graph): Observable<Results<T>>
```

`Returns`

An Observable of the find operation.

`Type parameters`

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

`Parameters`

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.

Name	Type	Description
`filter`	`Filter<T>`	A Filter to find Model instances by.
`graph`	`Graph<T>`	A Graph of fields to be returned.

`Source`

packages/data/src/model/model.ts:503

data.Model.**findOne** *(Static Method)*

Static **findOne** method. Calling this method on a class extending the abstract Model base class, while supplying the `shape` to match the Model instance by and a `graph` describing the fields to be included in the result, will dispatch the lookup operation to the respective repository by internally calling the commit operation with suitable arguments. Through this method, the retrieval of one specific Model instance from the respective Model repository can be achieved.

`Example`

Lookup one model instance by UUID:

```
import { ExampleModel } from './example-model';

ExampleModel.findOne({
  id: '2cfe7609-c4d9-4e4f-9a8b-ad72737db48a'
}, [
  'uuid',
  'modified',
  'field'
]).subscribe(console.log);
```

`Signature`

```
findOne<T>(this, shape, graph): Observable<T>
```

`Returns`

An Observable of the find operation.

`Type parameters`

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

`Parameters`

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`shape`	`Shape<T>`	The Shape of instance to find.
`graph`	`Graph<T>`	A Graph of fields to be returned.

`Source`

packages/data/src/model/model.ts:552

data.Model.**saveAll** *(Static Method)*

Static **saveAll** method. Calling this method on a class extending the abstract Model base class, while supplying a list of `models` which to save and a `graph` describing the fields to be returned in the result, will dispatch the save operation to the respective Model repository by internally calling the commit operation with suitable arguments. Through this method, bulk-persistance of Model instances from the respective Model repository can be achieved.

Example

Persist multiple Models:

```
import { ExampleModel } from './example-model';

ExampleModel.saveAll([
  new ExampleModel({ field: 'example_1' }),
  new ExampleModel({ field: 'example_2' }),
  new ExampleModel({ field: 'example_3' })
], [
  'uuid',
  'modified',
  'field'
]).subscribe(console.log);
```

Signature

```
saveAll<T>(this, models, graph): Observable<T[]>
```

Returns

An Observable of the save operation.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`models`	`T[]`	An array of Models to be saved.
`graph`	`Graph<T>`	The Graph of fields to be returned.

Source

packages/data/src/model/model.ts:598

data.Model.**saveOne** *(Static Method)*

Static **saveOne** method. Calling this method on a class extending the abstract Model base class, while supplying a `model` which to save and a `graph` describing the fields to be returned in the result, will dispatch the save operation to the respective Model repository by internally calling the commit operation with suitable arguments. Through this method, persistance of one specific Model instance from the respective Model repository can be achieved.

Example

Persist a model:

```
import { ExampleModel } from './example-model';

ExampleModel.saveOne(new ExampleModel({ field: 'example' }), [
  'uuid',
  'modified',
  'field'
]).subscribe(console.log);
```

Signature

```
saveOne<T>(this, model, graph): Observable<T>
```

Returns

An Observable of the save operation.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

`Parameters`

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`model`	`T`	The Model which is to be saved.
`graph`	`Graph<T>`	A Graph of fields to be returned.

`Source`

packages/data/src/model/model.ts:640

data.Model.**serialize** *(Static Method)*

Static **serialize** method. Calling this method on a class extending the Model, while supplying a `model` which to **serialize** and optionally enabling `shallow` serialization, will return the **serialize**d Shape of the Model, i.e., a plain JSON representation of all Model fields, or `undefined`, if the supplied `model` does not contain any fields or values. By serializing `shallow`ly, only such properties defined on the supplied `model` are included (which means, all one-to-one and one-to-many associations are ignored). Through this method, the serialization of one specific Model instance from the respective Model repository can be achieved.

`Example`

serialize a model:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({ field: 'example' });
const shape = ExampleModel.serialize(model);
console.log(shape); // { field: 'example' }
```

`Signature`

```
serialize<T>(this, model, shallow?): undefined | Shape<T>
```

`Returns`

The Shape of the Model or `undefined`.

`Type parameters`

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

`Parameters`

Name	Type	Default value	Description
`this`	`Type<T>`	`undefined`	The explicit static polymorphic `this` parameter.
`model`	`T`	`undefined`	The Model which is to be **serialize**d.
`shallow`	`boolean`	`false`	Whether to **serialize** the Model `shallow`ly.

`Source`

packages/data/src/model/model.ts:683

data.Model.**treemap** *(Static Method)*

Static **treemap** method. Calling this method on a class extending the abstract Model base class, while supplying a `model` which to **treemap** and optionally enabling `shallow` **treemap**ping, will return a Graph describing the fields which are declared and defined on the supplied `model`, or `undefined`, if the supplied `model` does not contain any fields or values. By **treemap**ping `shallow`ly, only properties defined on the supplied `model` are included (which means, all one-to-one and one-to-many associations are ignored). Through this method, the Graph for one specific Model instance from the respective Model repository can be retrieved.

`Example`

treemap a Model:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({ field: 'example' });
const graph = ExampleModel.treemap(model);
console.log(graph); // ['field']
```

`Signature`

```
treemap<T>(this, model, shallow?): undefined | Graph<T>
```

`Returns`

The Graph of the Model or `undefined`.

`Type parameters`

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

`Parameters`

Name	Type	Default value	Description
`this`	`Type<T>`	`undefined`	The explicit static polymorphic `this` parameter.
`model`	`T`	`undefined`	The Model which is to be **treemap**ped.
`shallow`	`boolean`	`false`	Whether to **treemap** the Model `shallow`ly.

`Source`

packages/data/src/model/model.ts:752

data.Model.**unravel** *(Static Method)*

Static **unravel** method. Calling this method on a class extending the abstract Model base class, while supplying a `graph` describing the fields which to **unravel**, will return the Graph as raw string. Through this method, the Graph for one specific Model instance from the respective Model repository can be **unravel**ed into a raw string. This **unravel**ed Graph can then be consumed by, e.g., the commit method.

`Example`

unravel a Graph:

```
import { ExampleModel } from './example-model';

const unraveled = ExampleModel.unravel([
  'uuid',
  'modified',
  'field'
]);

console.log(unraveled); // '{id modified field}'
```

Signature

```
unravel<T>(this, graph): string
```

Returns

The **unravel**ed Graph as raw string.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`graph`	`Graph<T>`	A Graph which is to be **unravel**ed.

Source

packages/data/src/model/model.ts:817

data.Model.**valuate** *(Static Method)*

Static **valuate** method. Calling this method on a class extending the abstract Model base class, while supplying a `model` and a `field` which to **valuate**, will return the preprocessed value (e.g., primitive representation of JavaScript Dates) of the supplied `field` of the supplied `model`. Through this method, the preprocessed `field` value of one specific Model instance from the respective Model repository can be retrieved.

Example

valuate a `field`:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({ created: new Date(0) });
const value = ExampleModel.valuate(model, 'created');
console.log(value); // '1970-01-01T00:00:00.000+00:00'
```

Signature

```
valuate<T>(this, model, field): unknown
```

Returns

The **valuate**d `field` value.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`model`	`T`	The Model which is to be **valuate**d.
`field`	`Field<T>`	A Field to be **valuate**d.

Source

packages/data/src/model/model.ts:887

data.Model.**[hasMany]** *(Optional Readonly Property)*

hasMany symbol property used by the HasMany decorator.

Source

packages/data/src/model/model.ts:942

data.Model.**[hasOne]** *(Optional Readonly Property)*

hasOne symbol property used by the HasOne decorator.

Source

packages/data/src/model/model.ts:937

data.Model.**[observable]** *(Method)*

Well-known `Symbol.observable` method returning a Subscribable. The returned Subscribable emits all changes this Model instance experiences.

Example

Subscribe to a Model instance:

```
import { from } from 'rxjs';
import { ExampleModel } from './example-model';

const model = new ExampleModel();
from(model).subscribe(console.log);
```

Signature

```
[observable](): Subscribable<M>
```

Returns

A Subscribable emitting all Model changes.

Source

packages/data/src/model/model.ts:1045

data.Model.**[property]** *(Optional Readonly Property)*

property symbol property used by the Property decorator.

Source

packages/data/src/model/model.ts:947

data.Model.**assign** *(Method)*

Instance-scoped **assign** method. Calling this method, while supplying a list of `parts`, will **assign** all supplied `parts` to the Model instance. The **assign**ment is implemented as deep merge **assign**ment. Using this method, an existing Model instance can easily be mutated while still emitting the mutated changes.

Example

assign `parts` to a Model instance:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel();
model.assign({ field: 'example' }).subscribe(console.log);
```

Signature

```
assign<T>(this, ...parts): Observable<T>
```

Returns

An Observable of the mutated instance.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>` = `M`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`T`	The explicit polymorphic `this` parameter.
`...parts`	`Shape<T>[]`	An array of `parts` to **assign** to this Model.

Source

packages/data/src/model/model.ts:1070

data.Model.**clear** *(Method)*

Instance-scoped **clear** method. Calling this method on an instance of a class extending the abstract Model base class, while optionally supplying a list of `keys` which are to be **clear**ed, will set the value of the properties described by either the supplied `keys` or, if no `keys` were supplied, all enumerable properties of the class extending the abstract Model base class to `undefined`, effectively **clear**ing them.

Example

clear a Model instance selectively:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({ field: 'example' });
model.clear(['field']).subscribe(console.log);
```

Signature

```
clear<T>(this, keys?): Observable<T>
```

Returns

An Observable of the mutated instance.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>` = `M`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`T`	The explicit polymorphic `this` parameter.
`keys?`	`Field<T>[]`	An optional array of `keys` to **clear**.

Source

packages/data/src/model/model.ts:1103

data.Model.**commit** *(Method)*

Instance-scoped **commit** method. Internally calls the commit method on the static `this`-context of an instance of a class extending the abstract Model base class and furthermore assigns the returned data to the Model instance the **commit** method was called upon. When supplying a `mapping`, the returned data will be mutated through the supplied `mapping` (otherwise this `mapping` defaults to identity).

Example

commit a `query`-type operation:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel();

model.commit(`query queryExample(variable: $variable) {
  result {
    field
  }
}`, {
  variable: 'value'
}).subscribe(console.log);
```

Signature

```
commit<T>(this, operation, variables?, mapping?): Observable<T>
```

Returns

An Observable of the mutated instance.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>` = `M`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`T`	The explicit polymorphic `this` parameter.
`operation`	`Operation`	The Operation to be **commit**ted.
`variables?`	`Variables`	Any Variables within the `operation`.
`mapping`	`(next: unknown) => Shape<T>`	An optional mutation to apply to the returned data.

Source

packages/data/src/model/model.ts:1160

data.Model.**constructor** *(Constructor)*

Public **constructor**. The **constructor** of all classes extending the abstract Model base class, unless explicitly overridden, behaves analogous to the instance-scoped assign method, as it takes all supplied `parts` and assigns them to the instantiated and returned Model. The **constructor** furthermore wires some internal functionality, e.g., creates a new changes BehaviorSubject which emits every mutation this Model instance experiences etc.

Signature

```
new Model<M>(...parts)
```

Type parameters

Name	Type
`M`	extends `Model<any, M>` = `any`

Parameters

Name	Type	Description
`...parts`	`Shape<M>[]`	An array of `parts` to assign.

`Source`

packages/data/src/model/model.ts:1022

data.Model.**created** *(Optional Property)*

Transient creation Date of this Model instance.

`Decorator`

Property

`Source`

packages/data/src/model/model.ts:963

data.Model.**delete** *(Method)*

Instance-scoped **delete** method. Internally calls the static deleteOne method while supplying the UUID of this instance of a class extending the abstract Model base class. Calling this method furthermore clears the Model instance and finalizes its deletion by completing the internal changes BehaviorSubject of the Model instance the **delete** method was called upon.

`Example`

delete a Model instance by UUID:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({
  id: '3068b30e-82cd-44c5-8912-db13724816fd'
});

model.delete().subscribe(console.log);
```

`Signature`

```
delete<T>(this): Observable<T>
```

`Returns`

An Observable of the mutated instance.

`Type parameters`

Name	Type	Description
`T`	extends `Model<any, T>` = `M`	The extending Model InstanceType.

`Parameters`

Name	Type	Description
`this`	`T`	The explicit polymorphic `this` parameter.

`Source`

packages/data/src/model/model.ts:1196

data.Model.**find** *(Method)*

Instance-scoped **find** method. Internally calls the findOne method on the static `this`-context of an instance of a class extending the abstract Model base class and then assigns the returned data to the Model instance the **find** method was called upon.

`Example`

find a Model instance by UUID:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({
  id: '3068b30e-82cd-44c5-8912-db13724816fd'
});

model.find([
  'uuid',
  'modified',
  'field'
]).subscribe(console.log);
```

`Signature`

```
find<T>(this, graph, shape?): Observable<T>
```

`Returns`

An Observable of the mutated instance.

`Type parameters`

Name	Type	Description
`T`	extends `Model<any, T>` = `M`	The extending Model InstanceType.

`Parameters`

Name	Type	Description
`this`	`T`	The explicit polymorphic `this` parameter.
`graph`	`Graph<T>`	A Graph of fields to be returned.
`shape`	`Shape<T>`	The Shape of the Model to find.

`Source`

packages/data/src/model/model.ts:1231

data.Model.**modified** *(Optional Property)*

Transient modification Date of this Model instance.

`Decorator`

Property

`Source`

packages/data/src/model/model.ts:971

data.Model.**save** *(Method)*

Instance-scoped **save** method. Internally calls the saveOne method on the static `this`-context of an instance of a class extending the abstract Model base class and then assigns the returned data to the Model instance the **save** method was called upon.

`Example`

save a Model instance:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({ field: 'example' });

model.save([
  'uuid',
  'modified',
  'field'
]).subscribe(console.log);
```

Signature

```
save<T>(this, graph?): Observable<T>
```

Returns

An Observable of the mutated instance.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>` = `M`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`T`	The explicit polymorphic `this` parameter.
`graph`	`Graph<T>`	A Graph of fields to be returned.

Source

packages/data/src/model/model.ts:1266

data.Model.**serialize** *(Method)*

Instance-scoped **serialize**r. Internally calls the serialize method on the static `this`-context of an instance of a class extending the abstract Model base class.

Example

serialize a Model instance:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({ field: 'example' });
console.log(model.serialize()); // { field: 'example' }
```

Signature

```
serialize<T>(this, shallow?): undefined | Shape<T>
```

Returns

The Shape of this instance or `undefined`.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>` = `M`	The extending Model InstanceType.

Parameters

Name	Type	Default value	Description
`this`	`T`	`undefined`	The explicit polymorphic `this` parameter.
`shallow`	`boolean`	`false`	Whether to **serialize** `shallowly`.

`Source`

packages/data/src/model/model.ts:1294

data.Model.**treemap** *(Method)*

Instance-scoped **treemap** method. Internally calls the treemap method on the static `this`-context of an instance of a class extending the abstract Model base class.

`Example`

treemap a Model instance:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({ field: 'example' });
console.log(model.treemap()); // ['field']
```

`Signature`

```
treemap<T>(this, shallow?): undefined | Graph<T>
```

`Returns`

A Graph of this instance or undefined.

`Type parameters`

Name	Type	Description
`T`	extends `Model<any, T>` = `M`	The extending Model InstanceType.

`Parameters`

Name	Type	Default value	Description
`this`	`T`	`undefined`	The explicit polymorphic `this` parameter.
`shallow`	`boolean`	`false`	Whether to **treemap** `shallowly`.

`Source`

packages/data/src/model/model.ts:1320

data.Model.**uuid** *(Optional Property)*

UUID of this Model instance.

`Decorator`

Property

`Source`

packages/data/src/model/model.ts:955

data.Model.[toStringTag] *(Protected Readonly Abstract Property)*

Enforced well-known `Symbol.toStringTag` property containing the singular name of this Model. The value of this property represents the repository which all instances of this Model are considered to belong to. In detail, the different operations committed through this Model are derived from this singular name (and the corresponding pluralized form).

Example

Provide a valid symbol property:

```
import { Model } from '@sgrud/data';

export class ExampleModel extends Model<ExampleModel> {

  protected [Symbol.toStringTag]: string = 'ExampleModel';

}
```

Source

packages/data/src/model/model.ts:932

data.Model.changes *(Protected Readonly Property)*

BehaviorSubject emitting every time this Model instance experiences **changes**.

Source

packages/data/src/model/model.ts:977

data.Model.entity *(Protected Accessor)*

Accessor to the singular name of this Model.

Signature

```
get entity(): string
```

Returns

The singular name of this Model.

Source

packages/data/src/model/model.ts:989

data.Model.plural *(Protected Accessor)*

Accessor to the **plural**ized name of this Model.

Signature

```
get plural(): string
```

Returns

The **plural**ized name of this Model.

Source

packages/data/src/model/model.ts:998

data.Model.static *(Protected Readonly Property)*

Type-asserted alias for the **static** Model context.

Source

packages/data/src/model/model.ts:982

data.Model.**type** *(Protected Accessor)*

Accessor to the raw name of this Model.

Signature

```
get type(): string
```

Returns

The raw name of this Model.

Source

packages/data/src/model/model.ts:1007

data.**Model** *(Namespace)*

The **Model** namespace contains types and interfaces used and intended to be used in conjunction with classes extending the abstract Model base class. All the types and interfaces within this namespace are only applicable to classes extending the abstract Model base class, as their generic type argument is always constrained to this abstract base class.

See

Model

Source

packages/data/src/model/model.ts:18, packages/data/src/model/model.ts:126, packages/data/src/model/model.ts:323

data.Model.**Field** *(Type alias)*

Type alias for all **Field**s, i.e., own enumerable properties (excluding internally used ones), of classes extending the abstract Model base class.

Type parameters

Name	Type	Description
`T`	extends `Model`	The extending Model InstanceType.

Source

packages/data/src/model/model.ts:28

data.Model.**Filter** *(Type alias)*

Filter type alias referencing the Params type.

See

Params

Type parameters

Name	Type	Description
`T`	extends `Model`	The extending Model InstanceType.

Source

packages/data/src/model/model.ts:38, packages/data/src/model/model.ts:126

data.Model.**Filter** *(Namespace)*

The **Filter** namespace contains types and interfaces to be used when searching through the repositories of classes extending the abstract Model base class. All the interfaces within this namespace are only applicable to classes extending the abstract Model base class, as their generic type argument is always constrained to this abstract base class.

See

Model

Source

packages/data/src/model/model.ts:38, packages/data/src/model/model.ts:126

data.Model.Filter.**Conjunction** *(Type alias)*

Type alias for a string union type of all possible **Conjunction**s, namely: `'AND'`, `'AND_NOT'`, `'OR'` and `'OR_NOT'`.

Source

packages/data/src/model/model.ts:132

data.Model.Filter.**Expression** *(Interface)*

Interface describing the shape of an **Expression** which may be employed through the Params as part of a findAll. **Expression**s can either be the plain shape of an entity or compositions of multiple conjunctions.

Type parameters

Name	Type	Description
`T`	extends `Model`	The extending Model InstanceType.

Source

packages/data/src/model/model.ts:160

data.Model.Filter.Expression.**conjunction** *(Optional Readonly Property)*

conjunction of multiple filter Expressions requested data Models are matched against. The **conjunction** sibling parameter entity has to be undefined when supplying this parameter. By supplying filter Expressions, conjunct by specific Conjunction operators, fine-grained filter operations can be compiled.

Type declaration

Name	Type	Description
`operands`	`Expression<T>[]`	List of Expressions which are logically combined through an operator. These Expressions may be nested and can be used to construct complex composite filter operations.
`operator?`	`Conjunction`	Conjunction **operator** used to logically combine all supplied operands.

Source

packages/data/src/model/model.ts:170

data.Model.Filter.Expression.**entity** *(Optional Readonly Property)*

Shape the requested data Models are matched against. Supplying this parameter requires the conjunction sibling parameter to be `undefined`. By specifying the **entity** shape to match data Models against, simple filter operations can be compiled.

`Type declaration`

Name	Type	Description
`operator?`	`Operator`	Operator to use for matching.
`path`	`Path<T, []>`	Property **path** from within the data Model which to match against. The value which will be matched against has to be supplied through the value property.
`value`	`unknown`	Property **value** to match data Models against. The property path to this value has to be supplied through the path property.

`Source`

packages/data/src/model/model.ts:193

data.Model.Filter.**Operator** *(Type alias)*

Type alias for a string union type of all possible **Operator**s, namely: `'EQUAL'`, `'NOT_EQUAL'`, `'LIKE'`, `'GREATER_THAN'`, `'GREATER_OR_EQUAL'`, `'LESS_THAN'` and `'LESS_OR_EQUAL'`.

`Source`

packages/data/src/model/model.ts:143

data.Model.Filter.**Params** *(Interface)*

Interface describing the **Params** for the findAll method. This is the most relevant interface within this namespace (and is therefore also referenced by the Filter type alias), as it describes the input **Params** of any selective data retrieval.

`See`

Model

`Type parameters`

Name	Type	Description
`T`	extends `Model`	The extending Model InstanceType.

`Source`

packages/data/src/model/model.ts:228

data.Model.Filter.Params.**dir** *(Optional Readonly Property)*

Desired sorting **dir**ection of the requested data Models. To specify which field the results should be sorted by, the sort property must be supplied.

`Source`

packages/data/src/model/model.ts:235

data.Model.Filter.Params.**expression** *(Optional Readonly Property)*

Expression to evaluate results against. This **expression** may be a simple matching or more complex, conjunct and nested **expression**s.

Source

packages/data/src/model/model.ts:242

data.Model.Filter.Params.**page** *(Optional Readonly Property)*

page number, i.e., offset within the list of all results for a data Model request. This property should be used together with the page size property.

Source

packages/data/src/model/model.ts:249

data.Model.Filter.Params.**search** *(Optional Readonly Property)*

Free-text **search** field. This field overrides all expressions, as such that if this field contains a value, all expressions are ignored and only this free-text **search** filter is applied.

Source

packages/data/src/model/model.ts:256

data.Model.Filter.Params.**size** *(Optional Readonly Property)*

Page **size**, i.e., number of results which should be included within the response to a data Model request. This property should be used together with the page offset property.

Source

packages/data/src/model/model.ts:263

data.Model.Filter.Params.**sort** *(Optional Readonly Property)*

Property path used to determine the value which to **sort** the requested data Models by. This property should be used together with the sorting direction property.

Source

packages/data/src/model/model.ts:270

data.Model.Filter.**Results** *(Interface)*

Interface describing the shape of Filtered **Results**. When invoking the findAll method, an Observable of this interface shape is returned.

Type parameters

Name	Type
`T`	extends `Model`

Source

packages/data/src/model/model.ts:279

data.Model.Filter.Results.**result** *(Property)*

An array of Models representing the Filtered **results**.

Source

packages/data/src/model/model.ts:284

data.Model.Filter.Results.**total** *(Property)*

The **total** number of Results, useful for the implementation of a pageable representation of Filtered Results.

Source

packages/data/src/model/model.ts:290

data.Model.**Graph** *(Type alias)*

Mapped type to compile strongly typed **Graph**s of classes extending the abstract Model base class, while providing intellisense.

Type parameters

Name	Type	Description
`T`	extends `Model`	The extending Model InstanceType.

Source

packages/data/src/model/model.ts:46

data.Model.**Path** *(Type alias)*

Mapped type to compile strongly typed property **Path**s of classes extending the abstract Model base class, while providing intellisense.

Type parameters

Name	Type	Description
`T`	extends `Model`	The extending Model InstanceType.
`N`	extends `string`[] = []	A string array type used to determine recursive depth.

Source

packages/data/src/model/model.ts:63

data.Model.**Shape** *(Type alias)*

Mapped type to compile strongly typed **Shape**s of classes extending the abstract Model base class, while providing intellisense.

Type parameters

Name	Type	Description
`T`	extends `Model`	The extending Model InstanceType.

Source

packages/data/src/model/model.ts:80

data.Model.**Type** *(Interface)*

Interface describing the **Type**, i.e., static constructable context, of classes extending the abstract Model base class.

Type parameters

Name	Type	Description
`T`	extends `Model`	The extending Model InstanceType.

`Hierarchy`

- `Required`<typeof `Model`>
  - **`Type`**

`Source`

packages/data/src/model/model.ts:97

data.Model.Type.**commit** *(Method)*

Static **commit** method. Calling this method on a class extending the abstract Model base class, while supplying an `operation` and all its embedded `variables`, will dispatch the Operation to the respective Model repository through the highest priority Querier or, if no Querier is compatible, an error is thrown. This method is the entry point for all Model-related data transferral and is internally called by all other distinct methods of the Model.

`Throws`

An Observable ReferenceError on incompatibility.

`Example`

commit a `query`-type operation:

```
import { ExampleModel } from './example-model';

ExampleModel.commit(`query queryExample(variable: $variable) {
  result {
    field
  }
}`, {
  variable: 'value'
}).subscribe(console.log);
```

`Signature`

```
commit<T>(this, operation, variables?): Observable<unknown>
```

`Returns`

An Observable of the **commit**med `operation`.

`Type parameters`

Name	Type	Description
`T`	extends `Model`<`any`, `T`>	The extending Model InstanceType.

`Parameters`

Name	Type	Description
`this`	`Type`<`T`>	The explicit static polymorphic `this` parameter.
`operation`	`Operation`	The Operation to be **commit**ted.
`variables?`	`Variables`	Any Variables within the `operation`.

`Source`

packages/data/src/model/model.ts:357

data.Model.Type.**constructor** *(Constructor)*

Overridden and concretized constructor signature.

Signature

```
new Type(...args)
```

Parameters

Name	Type	Description
`...args`	`Shape<Model<any>>[]`	The default class constructor rest parameter.

Source

packages/data/src/model/model.ts:97

data.Model.Type.**deleteAll** *(Method)*

Static **deleteAll** method. Calling this method on a class extending the Model, while supplying an array of `uuids`, will dispatch the deletion of all Model instances identified by these UUIDs to the respective Model repository by internally calling commit with suitable arguments. Through this method, bulk-deletions from the respective Model repository can be achieved.

Example

Drop all model instances by UUIDs:

```
import { ExampleModel } from './example-model';

ExampleModel.deleteAll([
  'b050d63f-cede-46dd-8634-a80d0563ead8',
  'a0164132-cd9b-4859-927e-ba68bc20c0ae',
  'b3fca31e-95cd-453a-93ae-969d3b120712'
]).subscribe(console.log);
```

Signature

```
deleteAll<T>(this, uuids): Observable<unknown>
```

Returns

An Observable of the deletion.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`uuids`	`string[]`	An array of `uuids` of Models to be deleted.

Source

packages/data/src/model/model.ts:410

data.Model.Type.**deleteOne** *(Method)*

Static **deleteOne** method. Calling this method on a class extending the Model, while supplying an `uuid`, will dispatch the deletion of the Model instance identified by this UUID to the respective repository by internally calling the commit operation with suitable arguments. Through this method, the deletion of a single Model instance from the respective Model repository can be achieved.

Example

Drop one model instance by UUID:

```
import { ExampleModel } from './example-model';

ExampleModel.deleteOne(
  '18f3aa99-afa5-40f4-90c2-71a2ecc25651'
).subscribe(console.log);
```

Signature

```
deleteOne<T>(this, uuid): Observable<unknown>
```

Returns

An Observable of the deletion.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`uuid`	`string`	The `uuid` of the Model instance to be deleted.

Source

packages/data/src/model/model.ts:444

data.Model.Type.**findAll** *(Method)*

Static **findAll** method. Calling this method on a class extending the abstract Model base class, while supplying a `filter` to match Model instances by and a `graph` containing the fields to be included in the result, will dispatch a lookup operation to the respective repository by internally calling the commit operation with suitable arguments. Through this method, the bulk-lookup of Model instances from the respective Model repository can be achieved.

Example

Lookup all UUIDs for model instances modified between two dates:

```
import { ExampleModel } from './example-model';

ExampleModel.findAll({
  expression: {
    conjunction: {
      operands: [
        {
          entity: {
            operator: 'GREATER_OR_EQUAL',
            path: 'modified',
            value: new Date('2021-01-01')
          }
        },
        {
          entity: {
            operator: 'LESS_OR_EQUAL',
            path: 'modified',
            value: new Date('2021-12-12')
          }
        }
      ],
      operator: 'AND'
```

```
    }
  }
}, [
  'uuid',
  'field'
]).subscribe(console.log);
```

Signature

```
findAll<T>(this, filter, graph): Observable<Results<T>>
```

Returns

An Observable of the find operation.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`filter`	`Filter<T>`	A Filter to find Model instances by.
`graph`	`Graph<T>`	A Graph of fields to be returned.

Source

packages/data/src/model/model.ts:503

data.Model.Type.**findOne** *(Method)*

Static **findOne** method. Calling this method on a class extending the abstract Model base class, while supplying the `shape` to match the Model instance by and a `graph` describing the fields to be included in the result, will dispatch the lookup operation to the respective repository by internally calling the commit operation with suitable arguments. Through this method, the retrieval of one specific Model instance from the respective Model repository can be achieved.

Example

Lookup one model instance by UUID:

```
import { ExampleModel } from './example-model';

ExampleModel.findOne({
  id: '2cfe7609-c4d9-4e4f-9a8b-ad72737db48a'
}, [
  'uuid',
  'modified',
  'field'
]).subscribe(console.log);
```

Signature

```
findOne<T>(this, shape, graph): Observable<T>
```

Returns

An Observable of the find operation.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`shape`	`Shape<T>`	The Shape of instance to find.
`graph`	`Graph<T>`	A Graph of fields to be returned.

Source

packages/data/src/model/model.ts:552

data.Model.Type.**prototype** *(Readonly Property)*

Overridden `prototype` signature.

Source

packages/data/src/model/model.ts:102

data.Model.Type.**saveAll** *(Method)*

Static **saveAll** method. Calling this method on a class extending the abstract Model base class, while supplying a list of `models` which to save and a `graph` describing the fields to be returned in the result, will dispatch the save operation to the respective Model repository by internally calling the commit operation with suitable arguments. Through this method, bulk-persistance of Model instances from the respective Model repository can be achieved.

Example

Persist multiple Models:

```
import { ExampleModel } from './example-model';

ExampleModel.saveAll([
  new ExampleModel({ field: 'example_1' }),
  new ExampleModel({ field: 'example_2' }),
  new ExampleModel({ field: 'example_3' })
], [
  'uuid',
  'modified',
  'field'
]).subscribe(console.log);
```

Signature

```
saveAll<T>(this, models, graph): Observable<T[]>
```

Returns

An Observable of the save operation.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`models`	`T[]`	An array of Models to be saved.
`graph`	`Graph<T>`	The Graph of fields to be returned.

Source

packages/data/src/model/model.ts:598

data.Model.Type.**saveOne** *(Method)*

Static **saveOne** method. Calling this method on a class extending the abstract Model base class, while supplying a `model` which to save and a `graph` describing the fields to be returned in the result, will dispatch the save operation to the respective Model repository by internally calling the commit operation with suitable arguments. Through this method, persistance of one specific Model instance from the respective Model repository can be achieved.

Example

Persist a model:

```
import { ExampleModel } from './example-model';

ExampleModel.saveOne(new ExampleModel({ field: 'example' }), [
  'uuid',
  'modified',
  'field'
]).subscribe(console.log);
```

Signature

```
saveOne<T>(this, model, graph): Observable<T>
```

Returns

An Observable of the save operation.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`model`	`T`	The Model which is to be saved.
`graph`	`Graph<T>`	A Graph of fields to be returned.

Source

packages/data/src/model/model.ts:640

data.Model.Type.**serialize** *(Method)*

Static **serialize** method. Calling this method on a class extending the Model, while supplying a `model` which to **serialize** and optionally enabling `shallow` serialization, will return the **serialize**d Shape of the Model, i.e., a plain JSON representation of all Model fields, or `undefined`, if the supplied `model` does not contain any fields or values. By serializing `shallow`ly, only such properties defined on the supplied `model` are included (which means, all one-to-one and one-to-many associations are ignored). Through this method, the serialization of one specific Model instance from the respective Model repository can be achieved.

Example

serialize a model:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({ field: 'example' });
const shape = ExampleModel.serialize(model);
console.log(shape); // { field: 'example' }
```

Signature

```
serialize<T>(this, model, shallow?): undefined | Shape<T>
```

Returns

The Shape of the Model or `undefined`.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Default value	Description
`this`	`Type<T>`	`undefined`	The explicit static polymorphic `this` parameter.
`model`	`T`	`undefined`	The Model which is to be **serialize**d.
`shallow`	`boolean`	`false`	Whether to **serialize** the Model `shallow`ly.

Source

packages/data/src/model/model.ts:683

data.Model.Type.**treemap** *(Method)*

Static **treemap** method. Calling this method on a class extending the abstract Model base class, while supplying a `model` which to **treemap** and optionally enabling `shallow` **treemap**ping, will return a Graph describing the fields which are declared and defined on the supplied `model`, or `undefined`, if the supplied `model` does not contain any fields or values. By **treemap**ping `shallow`ly, only properties defined on the supplied `model` are included (which means, all one-to-one and one-to-many associations are ignored). Through this method, the Graph for one specific Model instance from the respective Model repository can be retrieved.

Example

treemap a Model:

```
import { ExampleModel } from './example-model';

const model = new ExampleModel({ field: 'example' });
const graph = ExampleModel.treemap(model);
console.log(graph); // ['field']
```

Signature

```
treemap<T>(this, model, shallow?): undefined | Graph<T>
```

Returns

The Graph of the Model or `undefined`.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Default value	Description
`this`	`Type<T>`	`undefined`	The explicit static polymorphic `this` parameter.

Name	Type	Default value	Description
`model`	`T`	`undefined`	The Model which is to be **treemap**ped.
`shallow`	`boolean`	`false`	Whether to **treemap** the Model `shallow`ly.

`Source`

packages/data/src/model/model.ts:752

data.Model.Type.**unravel** *(Method)*

Static **unravel** method. Calling this method on a class extending the abstract Model base class, while supplying a `graph` describing the fields which to **unravel**, will return the Graph as raw string. Through this method, the Graph for one specific Model instance from the respective Model repository can be **unravel**ed into a raw string. This **unravel**ed Graph can then be consumed by, e.g., the commit method.

`Example`

unravel a Graph:

```
import { ExampleModel } from './example-model';

const unraveled = ExampleModel.unravel([
  'uuid',
  'modified',
  'field'
]);

console.log(unraveled); // '{id modified field}'
```

`Signature`

```
unravel<T>(this, graph): string
```

`Returns`

The **unravel**ed Graph as raw string.

`Type parameters`

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

`Parameters`

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`graph`	`Graph<T>`	A Graph which is to be **unravel**ed.

`Source`

packages/data/src/model/model.ts:817

data.Model.Type.**valuate** *(Method)*

Static **valuate** method. Calling this method on a class extending the abstract Model base class, while supplying a `model` and a `field` which to **valuate**, will return the preprocessed value (e.g., primitive representation of JavaScript Dates) of the supplied `field` of the supplied `model`. Through this method, the preprocessed `field` value of one specific Model instance from the respective Model repository can be retrieved.

`Example`

valuate a `field`:

```ts
import { ExampleModel } from './example-model';

const model = new ExampleModel({ created: new Date(0) });
const value = ExampleModel.valuate(model, 'created');
console.log(value); // '1970-01-01T00:00:00.000+00:00'
```

Signature

`valuate<T>(this, model, field): unknown`

Returns

The **valuate**d `field` value.

Type parameters

Name	Type	Description
`T`	extends `Model<any, T>`	The extending Model InstanceType.

Parameters

Name	Type	Description
`this`	`Type<T>`	The explicit static polymorphic `this` parameter.
`model`	`T`	The Model which is to be **valuate**d.
`field`	`Field<T>`	A Field to be **valuate**d.

Source

packages/data/src/model/model.ts:887

data.**Property** *(Type alias)*

Type alias for a union type of all primitive constructors which may be used as `typeFactory` argument for the Property decorator.

See

Property

Source

packages/data/src/relation/property.ts:61, packages/data/src/relation/property.ts:10

data.**Property** *(Function)*

Model field decorator factory. Using this decorator, Models can be enriched with primitive fields. The compatible primitives are the subset of primitives JavaScript shares with JSON, i.e., Boolean, Date (serialized), Number and String. Objects cannot be uses as a `typeFactory` argument value, as Model fields containing objects should be declared by the HasOne and HasMany decorators. By employing this decorator, the decorated field will (depending on the `transient` argument value) be taken into account when serializing or treemapping the Model containing the decorated field.

Example

Model with a primitive field:

```ts
import { Model, Property } from '@sgrud/data';

export class ExampleModel extends Model<ExampleModel> {

  @Property(() => String)
  public field?: string;

  protected [Symbol.toStringTag]: string = 'ExampleModel';

}
```

See

Model, HasOne, HasMany

Signature

```
Property<T>(typeFactory, transient?): <M>(model: M, field: Field<M>) => void
```

Returns

A Model field decorator.

Type parameters

Name	Type	Description
`T`	extends `Property`	The field value constructor type.

Parameters

Name	Type	Default value	Description
`typeFactory`	() => `T`	`undefined`	A forward reference to the field value constructor.
`transient`	`boolean`	`false`	Whether the decorated field is `transient`.

Source

packages/data/src/relation/property.ts:61, packages/data/src/relation/property.ts:10

data.**Querier** *(Abstract Class)*

Abstract **Querier** base class to implement Model **Querier**s. By extending this abstract base class and providing the extending class to the Linker, e.g., by Targeting it, the priority method of the resulting class will be called whenever the Model requests or persists data and, if this class claims the highest priority, its commit method will be called.

Decorator

Provide

Example

Simple **Querier** stub:

```
import { Provider, Target } from '@sgrud/core';
import { type Querier } from '@sgrud/data';
import { type Observable } from 'rxjs';

@Target()
export class ExampleQuerier
  extends Provider<typeof Querier>('sgrud.data.Querier') {

  public override readonly types: Set<Querier.Type> = new Set<Querier.Type>([
    'query'
  ]);

  public override commit(
    operation: Querier.Operation,
    variables: Querier.Variables
  ): Observable<unknown> {
    throw new Error('Stub!');
  }

  public override priority(): number {
    return 0;
  }

}
```

See

Model

Hierarchy

- **Querier**
  - BusQuerier
  - HttpQuerier

Source

packages/data/src/querier/querier.ts:12, packages/data/src/querier/querier.ts:89

data.Querier.**[provide]** *(Static Readonly Property)*

Magic string by which this class is provided.

See

provide

Source

packages/data/src/querier/querier.ts:96

data.Querier.**commit** *(Abstract Method)*

The overridden **commit** method of Targeted Queriers is called by the Model to execute Operations. The invocation arguments are the `operation`, unraveled into a string, and all `variables` embedded within this operation. The extending class has to serialize the Variables and handle the operation. It's the callers responsibility to unravel the Operation prior to invoking this method, and to deserialize and (error) handle whatever response is received.

Signature

```
commit(operation, variables?): Observable<unknown>
```

Returns

An Observable of the **commit**ted Operation.

Parameters

Name	Type	Description
`operation`	`Operation`	The Operation to be **commit**ted.
`variables?`	`Variables`	Any Variables within the Operation.

Source

packages/data/src/querier/querier.ts:118

data.Querier.**constructor** *(Constructor)*

Signature

```
new Querier()
```

data.Querier.**priority** *(Abstract Method)*

When the Model executes Operations, all Targeted and compatible Queriers, i.e., implementations of the this class capable of handling the specific Type of the Operation to commit, will be asked to prioritize themselves regarding the respective Model. The querier claiming the

highest **priority** will be chosen and its commit method called.

Signature

```
priority(model): number
```

Returns

The numeric **priority** of this Querier implementation.

Parameters

Name	Type	Description
`model`	`Type<Model<any>>`	The Model to be committed.

Source

packages/data/src/querier/querier.ts:134

data.Querier.**types** *(Readonly Abstract Property)*

A set containing all **types** of queries this Querier can handle. May contain any of the `'mutation'`, `'query'` and `'subscription'` Types.

Source

packages/data/src/querier/querier.ts:103

data.**Querier** *(Namespace)*

Querier namespace containing types and interfaces used and intended to be used in conjunction with the abstract Querier base class and in context of the Model data handling.

See

Querier

Source

packages/data/src/querier/querier.ts:12, packages/data/src/querier/querier.ts:89

data.Querier.**Operation** *(Type alias)*

String literal helper type. Enforces any assigned string to conform to the standard form of an **Operation**: A string starting with the Type, followed by one whitespace and the operation content.

Source

packages/data/src/querier/querier.ts:28

data.Querier.**Type** *(Type alias)*

Type alias for a string union type of all known Operation **Type**s: `'mutation'`, `'query'` and `'subscription'`.

Source

packages/data/src/querier/querier.ts:18

data.Querier.**Variables** *(Interface)*

Interface describing the shape of **Variables** which may be embedded within Operations. **Variables** are a simple key-value map, which can be deeply nested.

Source

packages/data/src/querier/querier.ts:35

data.**enumerate** *(Function)*

enumerate helper function. Enumerations are special objects and all used TypeScript `enums` have to be looped through this helper function before they can be utilized in conjunction with the Model.

Example

enumerate a TypeScript enumeration:

```
import { enumerate } from '@sgrud/data';

enum Enumeration {
  One = 'ONE',
  Two = 'TWO'
}

export type ExampleEnum = Enumeration;
export const ExampleEnum = enumerate(Enumeration);
```

See

Model

Signature

```
enumerate<T>(enumerator): T
```

Returns

The processed enumeration to be used by the Model.

Type parameters

Name	Type	Description
`T`	extends `object`	The type of TypeScript `enum`.

Parameters

Name	Type	Description
`enumerator`	`T`	The TypeScript `enum` to **enumerate**.

Source

packages/data/src/model/enum.ts:49

data.**hasMany** *(Const Variable)*

Unique symbol used as property key by the HasMany decorator to register decorated Model fields for further computation, e.g., serialization, treemapping etc.

See

HasMany

Source

packages/data/src/relation/has-many.ts:11

data.**hasOne** *(Const Variable)*

Unique symbol used as property key by the HasOne decorator to register decorated Model fields for further computation, e.g., serialization, treemapping etc.

`See`

HasOne

`Source`

packages/data/src/relation/has-one.ts:11

data.**property** *(Const Variable)*

Unique symbol used as property key by the Property decorator to register decorated Model fields for further computation, e.g., serialization, treemapping etc.

`See`

Property

`Source`

packages/data/src/relation/property.ts:24

shell Module

`@sgrud/shell` - The SGRUD Web UI Shell.

The functions and classes found within the **`@sgrud/shell`** module are intended to ease the implementation of Component-based frontends by providing JSX runtime bindings via the `@sgrud/shell/jsx-runtime` module for the incremental-dom library and the Router to enable routing through Components based upon the SGRUD client libraries, but not limited to those. Furthermore, complex routing strategies and actions may be implemented through the interceptor-like Queue pattern.

`Source`

packages/shell/index.ts:1

shell.**Attribute** *(Function)*

Component prototype property decorator factory. Applying the **Attribute** decorator to a property of a Component binds the decorated property to the corresponding **Attribute** of the respective Component. This implies that the **Attribute** `name` is appended to the observedAttributes array of the Component and the decorated property is replaced with a getter and setter deferring those operations to the **Attribute**. If no `name` supplied, the name of the decorated property will be used instead. Further, if both, a parameter initializer and an initial **Attribute** value are supplied, the **Attribute** value takes precedence.

`Example`

Bind a property to an **Attribute**:

```
import { Attribute, Component } from '@sgrud/shell';

declare global {
  interface HTMLElementTagNameMap {
    'example-component': ExampleComponent;
  }
}

@Component('example-component')
export class ExampleComponent extends HTMLElement implements Component {

  @Attribute()
  public field?: string;

  public get template(): JSX.Element {
    return <span>Attribute value: {this.field}</span>;
  }

}
```

`See`

Component

`Signature`

```
Attribute(name?): (prototype: Component, propertyKey: PropertyKey) => void
```

`Returns`

A Component prototype property decorator.

`Parameters`

Name	Type	Description
`name?`	`string`	The Component **Attribute** `name`.

`Source`

packages/shell/src/component/attribute.ts:45

shell.**Catch** *(Type alias)*

The **Catch** type alias is used and intended to be used in conjunction with the CatchQueue and represents a function that is called with the thrown `error`. The return value of this callback will be used to examine whether the Component containing the decorated property is responsible to handle the thrown `error`.

`See`

CatchQueue

`Source`

packages/shell/src/queue/catch.ts:61, packages/shell/src/queue/catch.ts:17

shell.**Catch** *(Function)*

Component prototype property decorator factory. Applying the **Catch** decorator to a property, while optionally supplying a **trap** will navigate to the Component containing the decorated property when an error, **trap**ed by this **Catch** decorator, occurs during navigation.

`Example`

Catch all URIErrors:

```
import { Component, Catch } from '@sgrud/shell';

declare global {
  interface HTMLElementTagNameMap {
    'example-component': ExampleComponent;
  }
}

@Component('example-component')
export class ExampleComponent extends HTMLElement implements Component {

  @Catch((error) => error instanceof URIError)
  public readonly error?: URIError;

  public get template(): JSX.Element {
    return <span>Error message: {this.error?.message}</span>;
  }

}
```

`See`

CatchQueue

`Signature`

```
Catch(trap?): (prototype: Component, propertyKey: PropertyKey) => void
```

`Returns`

A Component prototype property decorator.

`Parameters`

Name	Type	Description
`trap?`	`Catch`	The Catch callback deciding whether to `trap` an error.

`Source`

packages/shell/src/queue/catch.ts:61, packages/shell/src/queue/catch.ts:17

shell.**CatchQueue** *(Class)*

This built-in **CatchQueue** extension of the Queue base class is used by the Catch decorator to intercept Router navigation events and handles all

errors thrown during the asynchronous evaluation of navigate invocations. When the Catch decorator is applied at least once this **CatchQueue** will be automatically provided as Queue to the Linker-

Decorator

Singleton

See

Queue

Hierarchy

- `Queue<this>`
  - **CatchQueue**

Source

packages/shell/src/queue/catch.ts:117

shell.CatchQueue.**[provide]** *(Static Readonly Property)*

Magic string by which this class is provided.

See

provide

Source

packages/shell/src/queue/queue.ts:49

shell.CatchQueue.**constructor** *(Constructor)*

Public Singleton **constructor**. Called by the Catch decorator to link this Queue into the Router and to access the trapped and traps properties.

Signature

```
new CatchQueue()
```

Source

packages/shell/src/queue/catch.ts:145

shell.CatchQueue.**handle** *(Method)*

Overridden **handle** method of the Queue base class. Iterates all Segments of the `next` State and collects all traps for any encountered Components in those iterated Segments.

Signature

```
handle(_prev, next, queue): Observable<State<string>>
```

Returns

An Observable of the **handle**d State.

Parameters

Name	Type	Description
`_prev`	`State<string>`	The _previously active State (ignored).
`next`	`State<string>`	The `next` State navigated to.
`queue`	`Queue`	The next Queue to **handle** the navigation.

Source

packages/shell/src/queue/catch.ts:163

shell.CatchQueue.**trapped** *(Readonly Property)*

Mapping of all decorated Components to a Map of property keys and **trapped** errors.

Source

packages/shell/src/queue/catch.ts:124

shell.CatchQueue.**traps** *(Readonly Property)*

Mapping of all decorated Components to a Map of property keys and their **traps**.

Source

packages/shell/src/queue/catch.ts:130

shell.CatchQueue.**handleErrors** *(Private Method)*

handleErrors helper method returning an Observable from the global `window.onerror` and `window.unhandledrejection` event emitters. The returned Observable will either NEVER complete or invoke throwError with any globally emitted ErrorEvent or the reason for a PromiseRejectionEvent while subscribed to.

Throws

An Observable of any globally emitted error or rejection.

Signature

```
handleErrors(): Observable<never>
```

Returns

An Observable that NEVER completes.

Source

packages/shell/src/queue/catch.ts:260

shell.CatchQueue.**router** *(Private Readonly Property)*

Factored-in **router** property linking the Router.

Decorator

Factor

Source

packages/shell/src/queue/catch.ts:138

shell.**Component** *(Function)*

Class decorator factory. Registers the decorated class as **Component** through the customElements registry. Registered **Component**s can be used in conjunction with any of the Attribute, Fluctuate and Reference prototype property decorators which will trigger their respective callbacks or renderComponent whenever one of the observedAttributes, observedFluctuations or observedReferences changes. While any **Component** registered by this decorator is enriched with basic rendering functionality, any implemented method will cancel out its `super` logic.

Example

Register a **Component**:

```
import { Component } from '@sgrud/shell';

declare global {
  interface HTMLElementTagNameMap {
    'example-component': ExampleComponent;
  }
}

@Component('example-component')
export class ExampleComponent extends HTMLElement implements Component {

  public readonly styles: string[] = [`
    span {
      font-style: italic;
    }
  `];

  public get template(): JSX.Element {
    return <span>Example component</span>;
  }

}
```

See

Attribute, Reference

Signature

```
Component<S, K>(selector, inherits?): <T>(constructor: T) => T
```

Returns

A class constructor decorator.

Type parameters

Name	Type	Description
`S`	extends `CustomElementTagName`	The custom **Component** tag name `selector` type.
`K`	extends `HTMLElementTagName`	-

Parameters

Name	Type	Description
`selector`	`S`	The custom **Component** tag name `selector`.
`inherits?`	`K`	The HTMLElement this **Component** `inherits` from.

Source

packages/shell/src/component/component.ts:154, packages/shell/src/component/component.ts:16

shell.**Component** *(Interface)*

An interface describing the shape of a **Component**. Mostly adheres to the Web Components specification while providing rendering and change detection capabilities.

Hierarchy

- `HTMLElement`
  - **Component**

Source

packages/shell/src/component/component.ts:154, packages/shell/src/component/component.ts:16

shell.Component.**adoptedCallback** *(Optional Method)*

Called when the Component is moved between Documents.

Signature

```
adoptedCallback(): void
```

Source

packages/shell/src/component/component.ts:52

shell.Component.**attributeChangedCallback** *(Optional Method)*

Called when one of the Component's observed Attributes is added, removed or changed. Which Component attributes are observed depends on the contents of the observedAttributes array.

Signature

```
attributeChangedCallback(name, prev?, next?): void
```

Parameters

Name	Type	Description
`name`	`string`	The `name` of the changed attribute.
`prev?`	`string`	The `previous` value of the changed attribute.
`next?`	`string`	The `next` value of the changed attribute.

Source

packages/shell/src/component/component.ts:63

shell.Component.**connectedCallback** *(Optional Method)*

Called when the Component is appended to the Document.

Signature

```
connectedCallback(): void
```

Source

packages/shell/src/component/component.ts:68

shell.Component.**constructor** *(Constructor)*

shell.Component.**disconnectedCallback** *(Optional Method)*

Called when the Component is removed from the Document.

Signature

```
disconnectedCallback(): void
```

Source

packages/shell/src/component/component.ts:73

shell.Component.**fluctuationChangedCallback** *(Optional Method)*

This callback is invoked whenever a Component Fluctuates, i.e., if the any of its decorated `propertyKeys` is assigned the `next` value emitted by one of the observedFluctuations.

Signature

```
fluctuationChangedCallback(propertyKey, prev, next): void
```

Parameters

Name	Type	Description
`propertyKey`	`PropertyKey`	The `propertyKey` that Fluctuated.
`prev`	`unknown`	-
`next`	`unknown`	The `previous` value of the Fluctuated `propertyKey`.

Source

packages/shell/src/component/component.ts:84

shell.Component.**observedAttributes** *(Optional Readonly Property)*

Array of Attribute names, which should be observed for changes, which will trigger the attributeChangedCallback.

Source

packages/shell/src/component/component.ts:22

shell.Component.**observedFluctuations** *(Optional Readonly Property)*

A Record of Subscriptions opened by the Fluctuate decorator which trigger the fluctuationChangedCallback upon each emission, while subscribed to.

Source

packages/shell/src/component/component.ts:29

shell.Component.**observedReferences** *(Optional Readonly Property)*

A Record of References and observed events, which, when emitted by the reference, trigger the referenceChangedCallback.

Source

packages/shell/src/component/component.ts:35

shell.Component.**referenceChangedCallback** *(Optional Method)*

Called when one of the Component's Referenced and observed nodes emits an event. Which Referenced nodes are observed for which events depends on the contents of the observedReferences mapping.

Signature

```
referenceChangedCallback(key, node, event): void
```

Parameters

Name	Type	Description
`key`	`Key`	The `key` used to Reference the `node`.
`node`	`Node`	The Referenced `node`.
`event`	`Event`	The `event` emitted by the `node`.

Source

packages/shell/src/component/component.ts:99

shell.Component.**renderComponent** *(Optional Method)*

Called when the Component has changed and should render.

Signature

```
renderComponent(): void
```

Source

packages/shell/src/component/component.ts:104

shell.Component.**styles** *(Optional Readonly Property)*

Array of CSS **styles** in string form, which should be included within the ShadowRoot of the Component.

Source

packages/shell/src/component/component.ts:41

shell.Component.**template** *(Optional Readonly Property)*

JSX representation of the Component **template**. If no template is supplied, an HTMLSlotElement will be rendered instead.

Source

packages/shell/src/component/component.ts:47

shell.**CustomElementTagName** *(Type alias)*

String literal helper type. Enforces any assigned string to be a `keyof` HTMLElementTagNameMap, while excluding built-in tag names, i.e., extracting `${string}-${string}` keys of the HTMLElementTagNameMap.

Example

A valid **CustomElementTagName**:

```
const tagName: CustomElementTagName = 'example-component';
```

Source

packages/shell/src/component/runtime.ts:18

shell.**Fluctuate** *(Function)*

Component prototype property decorator factory. Applying this **Fluctuate** decorator to a property of a custom Component while supplying a `streamFactory` that returns an ObservableInput upon invocation will subscribe the fluctuationChangedCallback method to each emission

from this ObservableInput and replace the decorated property with a getter returning its last emitted value. Further, the resulting subscription, referenced by the decorated property, is assigned to the observedFluctuations property and may be terminated by unsubscribing manually. Finally, the Component will seize to **Fluctuate** automatically when it's disconnected from the Document.

Example

A Component that **Fluctuate**s:

```
import { Component, Fluctuate } from '@sgrud/shell';
import { fromEvent } from 'rxjs';

declare global {
  interface HTMLElementTagNameMap {
    'example-component': ExampleComponent;
  }
}

@Component('example-component')
export class ExampleComponent extends HTMLElement implements Component {

  @Fluctuate(() => fromEvent(document, 'click'))
  private readonly pointer?: MouseEvent;

  public get template(): JSX.Element {
    return <span>Clicked at ({this.pointer?.x}, {this.pointer?.y})</span>;
  }

}
```

See

Component

Signature

```
Fluctuate(streamFactory): (prototype: Component, propertyKey: PropertyKey) => void
```

Returns

A Component prototype property decorator.

Parameters

Name	Type	Description
`streamFactory`	() => `ObservableInput<unknown>`	A forward reference to an ObservableInput.

Source

packages/shell/src/component/fluctuate.ts:47

shell.**HTMLElementTagName** *(Type alias)*

String literal helper type. Enforces any assigned string to be a `keyof` HTMLElementTagNameMap, while excluding custom element tag names, i.e., `${string}-${string}` keys of the HTMLElementTagNameMap.

Example

A valid **HTMLElementTagName**:

```
const tagName: HTMLElementTagName = 'div';
```

Source

packages/shell/src/component/runtime.ts:32

shell.**JSX** *(Namespace)*

The intrinsic JSX namespace used by TypeScript to determine the Element type and all valid IntrinsicElements.

Source

packages/shell/src/component/runtime.ts:40

shell.JSX.**Element** *(Type alias)*

Intrinsic JSX **Element** type helper representing an array of bound elementOpen and elementClose calls.

Source

packages/shell/src/component/runtime.ts:46

shell.JSX.**IntrinsicElements** *(Type alias)*

List of known JSX **IntrinsicElements**, comprised of the global HTMLElementTagNameMap.

Source

packages/shell/src/component/runtime.ts:52

shell.JSX.**Key** *(Type alias)*

Key references type helper. Enforces any assigned values to be of a compatible **Key** type.

Source

packages/shell/src/component/runtime.ts:84

shell.**Queue** *(Abstract Class)*

Abstract base class to implement Router **Queue**s. By applying the Target decorator or otherwise providing an implementation of this abstract **Queue** base class to the Linker, the implemented handle method is called whenever a new State is triggered by navigating. This interceptor-like pattern makes complex routing strategies like asynchronous module-retrieval and the similar tasks easy to be implemented.

Decorator

Provide

Example

Simple **Queue** stub:

```
import { Provider, Target } from '@sgrud/core';
import { type Router, type Queue } from '@sgrud/shell';
import { type Observable } from 'rxjs';

@Target()
export class ExampleQueue
  extends Provider<typeof Queue>('sgrud.shell.Queue') {

  public override handle(
    prev: Router.State,
    next: Router.State,
    queue: Router.Queue
  ): Observable<Router.State> {
    throw new Error('Stub!');
  }

}
```

See

Route, Router

Hierarchy

- **Queue**
  - CatchQueue
  - ResolveQueue

Source

packages/shell/src/queue/queue.ts:42

shell.Queue.**[provide]** *(Static Readonly Property)*

Magic string by which this class is provided.

See

provide

Source

packages/shell/src/queue/queue.ts:49

shell.Queue.**constructor** *(Constructor)*

Signature

```
new Queue()
```

shell.Queue.**handle** *(Abstract Method)*

Abstract **handle** method, called whenever a new State should be navigated to. This method provides the possibility to intercept these upcoming States and, e.g., mutate or redirect them, i.e., **handle** the navigation.

Signature

```
handle(prev, next, queue): Observable<State<string>>
```

Returns

An Observable of the **handle**d State.

Parameters

Name	Type	Description
prev	State<string>	The previously active State.
next	State<string>	The next State navigated to.
queue	Queue	The next Queue to **handle** the navigation.

Source

packages/shell/src/queue/queue.ts:62

shell.**Reference** *(Function)*

Component prototype property decorator factory. Applying this **Reference** decorator to a property of a registered Component while supplying the referenceing Key] and, optionally, an array of event names to observe, will replace the decorated property with a getter returning the referenced node, once rendered. If an array of event names is supplied, whenever one of those observed events is emitted by the referenced node, the referenceChangedCallback of the Component is called with the reference key, the referenced node and the emitted event.

Example

Reference a node:

```
import { Component, Reference } from '@sgrud/shell';

declare global {
  interface HTMLElementTagNameMap {
    'example-component': ExampleComponent;
  }
}

@Component('example-component')
export class ExampleComponent extends HTMLElement implements Component {

  @Reference('example-key')
  private readonly span?: HTMLSpanElement;

  public get template(): JSX.Element {
    return <span key="example-key"></span>;
  }

}
```

See

Component

Signature

```
Reference(reference, observe?): (prototype: Component, propertyKey: PropertyKey) => void
```

Returns

A Component prototype property decorator.

Parameters

Name	Type	Description
`reference`	`Key`	The `referenceing` Key.
`observe?`	keyof `HTMLElementEventMap`[]	An array of event names to `observe`.

Source

packages/shell/src/component/reference.ts:48

shell.**Resolve** *(Type alias)*

Type parameters

Name	Type	Description
`S`	extends `string`	The Route path string type.

Type declaration

The **Resolve** type alias is used and intended to be used in conjunction with the ResolveQueue Queue and the Resolve decorator. The **Resolve** type alias represents a function that will be called with the respective Segment and State.

See

Resolve

Signature

```
(segment, state): ObservableInput<unknown>
```

Parameters

Name	Type
`segment`	`Segment<S>`
`state`	`State<S>`

`Source`

packages/shell/src/queue/resolve.ts:71, packages/shell/src/queue/resolve.ts:18

shell.**Resolve** *(Function)*

Component prototype property decorator factory. Applying the **Resolve** decorator to a property of a Component, while supplying an ObservableInput to be `resolve`d, will replace the decorated property with a getter returning the **Resolve**d value the supplied ObservableInput `resolve`s to. To do so the **Resolve** decorator relies on the built-in ResolveQueue.

`Example`

Resolve the Segment and State:

```
import { Component, Resolve } from '@sgrud/shell';
import { of } from 'rxjs';

declare global {
  interface HTMLElementTagNameMap {
    'example-component': ExampleComponent;
  }
}

@Component('example-component')
export class ExampleComponent extends HTMLElement implements Component {

  @Resolve((segment, state) => of([segment.route.path, state.search]))
  public readonly resolved!: [string, string];

  public get template(): JSX.Element {
    return <span>Resolved: {this.resolved.join('?')}</span>;
  }

}
```

`See`

ResolveQueue

`Signature`

```
Resolve<S>(resolve): (prototype: Component, propertyKey: PropertyKey) => void
```

`Returns`

A Component prototype property decorator.

`Type parameters`

Name	Type	Description
`S`	extends `string`	The Route path string type.

`Parameters`

Name	Type	Description
`resolve`	`Resolve<S>`	An ObservableInput to `resolve`.

`Source`

packages/shell/src/queue/resolve.ts:71, packages/shell/src/queue/resolve.ts:18

shell.**ResolveQueue** *(Class)*

This built-in **ResolveQueue** extension of the Queue base class intercepts all navigational events of the Router to Resolve ObservableInputs before invoking subsequent Queues. Thereby this **ResolveQueue** allows asynchronous evaluations to be executed and their Resolved values to be provided to a Component, before it is rendered into a Document for the first time. When the Catch decorator is applied at least once this **ResolveQueue** will be automatically provided as Queue to the Linker.

Decorator

Singleton

See

Queue

Hierarchy

- `Queue<this>`
  - **ResolveQueue**

Source

packages/shell/src/queue/resolve.ts:129

shell.ResolveQueue.**[provide]** *(Static Readonly Property)*

Magic string by which this class is provided.

See

provide

Source

packages/shell/src/queue/queue.ts:49

shell.ResolveQueue.**constructor** *(Constructor)*

Public Singleton **constructor**. Called by the Resolve decorator to link this Queue into the Router and to access the required and resolved properties.

Signature

```
new ResolveQueue()
```

Source

packages/shell/src/queue/resolve.ts:149

shell.ResolveQueue.**handle** *(Method)*

Overridden **handle** method of the Queue base class. Iterates all Segments of the `next` State and collects all Resolvers for any encountered Components in those iterated Segments. The collected Resolvers are run before invoking the subsequent Queue.

Signature

```
handle(_prev, next, queue): Observable<State<string>>
```

Returns

An Observable of the **handle**d State.

Parameters

Name	Type	Description
`_prev`	`State<string>`	The `_prev`iously active State (ignored).
`next`	`State<string>`	The `next` State navigated to.

Name	Type	Description
queue	Queue	The next Queue to **handle** the navigation.

Source

packages/shell/src/queue/resolve.ts:168

shell.ResolveQueue.**required** *(Readonly Property)*

Mapping of all decorated Components to a Map of property keys and their **required** Resolvers.

Source

packages/shell/src/queue/resolve.ts:136

shell.ResolveQueue.**resolved** *(Readonly Property)*

Mapping of all decorated Components to an object consisting of property keys and their corresponding Resolved return values.

Source

packages/shell/src/queue/resolve.ts:142

shell.**Route** *(Function)*

Class decorator factory. Applying the **Route** decorator to a custom element will associate the supplied `config` with the decorated element constructor. Further, the `config`ured children are iterated over and every child that is a custom element itself will be replaced by its respective route configuration or ignored, if no configuration was associated with the child. Finally, the processed `config` is added to the Router.

Example

Associate a Route `config` to a Component:

```
import { Component, Route } from '@sgrud/shell';
import { ChildComponent } from './child-component';

@Route({
  path: 'example',
  children: [
    ChildComponent
  ]
})
@Component('example-element')
export class ExampleComponent extends HTMLElement implements Component {}
```

See

Router

Signature

```
Route<S>(config): <T>(constructor: T) => void
```

Returns

A class constructor decorator.

Type parameters

Name	Type	Description
S	extends string	The Route path string type.

Parameters

Name	Type	Description
`config`	`Assign<{ children?: (Route<string> | CustomElementConstructor & { [route]?: Route<string> })[] ; slots?: Record<string, CustomElementConstructor | CustomElementTagName> }, Omit<Route<S>, "component">> & { parent?: Route<string> | CustomElementConstructor & { [route]?: Route<string> } }`	The Route `config` for this element.

`Source`

packages/shell/src/router/route.ts:94, packages/shell/src/router/route.ts:33

shell.**Route** *(Interface)*

Interface describing the shape of a **Route**. A **Route** must consist of at least a path and may specify a component, as well as slots, which will be rendered into the RouterOutlet when the **Route** is navigated to. Furthermore a **Route** may also specify children.

`Example`

Define a **Route**:

```
import { type Route } from '@sgrud/shell';

const route: Route = {
  path: '',
  component: 'example-element',
  children: [
    {
      path: 'child',
      component: 'child-element'
    }
  ]
};
```

`See`

Router

`Type parameters`

Name	Type	Description
`S`	extends `string` = `string`	The **Route** path string type.

`Source`

packages/shell/src/router/route.ts:94, packages/shell/src/router/route.ts:33

shell.Route.**children** *(Optional Readonly Property)*

Optional array of **children** for this Route.

`Source`

packages/shell/src/router/route.ts:38

shell.Route.**component** *(Optional Readonly Property)*

Optional Route **component**.

Source

packages/shell/src/router/route.ts:43

shell.Route.**constructor** *(Constructor)*

shell.Route.**path** *(Readonly Property)*

Required Route **path**.

Source

packages/shell/src/router/route.ts:48

shell.Route.**slots** *(Optional Readonly Property)*

Optional mapping of elements to their **slots**.

Source

packages/shell/src/router/route.ts:53

shell.**Router** *(Class)*

Targeted Singleton **Router** class extending the built-in Set. This Singleton class provides routing and rendering capabilities. Routing is primarily realized by maintaining the inherited Set of Routes and (recursively) matching paths against those Routes, when instructed so by the navigate method. When a matching Segment is found, the corresponding Components are rendered by the handle method (which is part of the implemented Queue contract).

Decorator

Target, Singleton

Hierarchy

- `Set<Route>`
  - **Router**

Implements

`Queue`

Source

packages/shell/src/router/router.ts:13, packages/shell/src/router/router.ts:165

shell.Router.**[observable]** *(Static Method)*

Static `Symbol.observable` method returning a Subscribable. The returned Subscribable mirrors the private loader and is used for initializations after a new global Route tree was added to the Router.

Example

Subscribe to the Router:

```
import { Router } from '@sgrud/shell';
import { from } from 'rxjs';

from(Router).subscribe(console.log);
```

Signature

```
[observable](): Subscribable<Router>
```

Returns

A Subscribable emitting this Router.

Source

packages/shell/src/router/router.ts:192

shell.Router.**loader** *(Static Private Property)*

Private static ReplaySubject used as the Router **loader**. This **loader** emits every time Routes are added, whilst the size being `0`, so either for the first time after construction or after the Router was cleared.

Source

packages/shell/src/router/router.ts:173

shell.Router.**[iterator]** *(Readonly Property)*

`declared` well-known `Symbol.iterator` property. This declaration enforces correct typing when retrieving the Subscribable from the well-known `Symbol.observable` method by voiding the inherited `Symbol.iterator`.

Source

packages/shell/src/router/router.ts:208

shell.Router.**[observable]** *(Method)*

Well-known `Symbol.observable` method returning a Subscribable. The returned Subscribable emits the current State and every time this changes.

Example

Subscribe to upcoming States:

```
import { Router } from '@sgrud/shell';
import { from } from 'rxjs';

from(new Router()).subscribe(console.log);
```

Signature

```
[observable](): Subscribable<State<string>>
```

Returns

A Subscribable emitting States.

Source

packages/shell/src/router/router.ts:286

shell.Router.**add** *(Method)*

Overridden **add** method. Invoking this method while supplying a `route` will **add** the supplied `route` to the Router after deleting its child Routes from the Router, thereby ensuring that only root `routes` remain part of the Router.

Signature

```
add(route): Router
```

Returns

This instance of the Router.

Parameters

Name	Type	Description
`route`	`Route<string>`	The Route to **add** to the Router.

Source

packages/shell/src/router/router.ts:299

shell.Router.**baseHref** *(Readonly Property)*

An absolute **baseHref** for navigation.

Source

packages/shell/src/router/router.ts:215

shell.Router.**connect** *(Method)*

connecting helper method. Calling this method will **connect** a handler to the global `onpopstate` event, invoking navigate with the appropriate arguments. This method furthermore allows the properties baseHref, hashBased and outlet to be overridden. Invoking the **connect** method throws an error if called more than once, without invoking the disconnect method in between invocations.

Throws

A ReferenceError if already **connect**ed.

Signature

```
connect(this, outlet?, baseHref?, hashBased?): void
```

Parameters

Name	Type	Description
`this`	`Mutable<Router>`	The Mutable explicit polymorphic `this` parameter.
`outlet`	`Element | DocumentFragment`	The rendering `outlet` for Routes.
`baseHref`	`string`	An absolute `baseHref` for navigation.
`hashBased`	`boolean`	Whether to employ `hashBased` routing.

Source

packages/shell/src/router/router.ts:331

shell.Router.**constructor** *(Constructor)*

Public Singleton Router class **constructor**. This **constructor** is called once by the Target decorator and sets initial values on this instance. All subsequent calls will return the previously constructed Singleton instance of this class.

Signature

```
new Router()
```

Source

packages/shell/src/router/router.ts:251

shell.Router.**disconnect** *(Method)*

disconnecting helper method. Calling this method (after calling connect) will **disconnect** the previously connected handler from the global `onpopstate` event. Further, the arguments passed to connect are revoked, meaning the default values of the properties baseHref, hashBased and outlet are restored. Calling this method without previously connecting the Router throws an error.

`Throws`

A ReferenceError if already **disconnect**ed.

`Signature`

```
disconnect(this): void
```

`Parameters`

Name	Type	Description
`this`	`Mutable<Router>`	The Mutable explicit polymorphic `this` parameter.

`Source`

packages/shell/src/router/router.ts:373

shell.Router.**handle** *(Method)*

Implementation of the **handle** method as required by the Queue interface contract. It is called internally by the navigate method after all Queues have been invoked. It is therefore considered the default or fallback Queue and handles the rendering of the supplied `state`.

`Signature`

```
handle(state, action?): Observable<State<string>>
```

`Returns`

An Observable of the handled State.

`Parameters`

Name	Type	Default value	Description
`state`	`State<string>`	`undefined`	The next State to handle.
`action`	`Action`	`'push'`	The Action to apply to the History.

`Source`

packages/shell/src/router/router.ts:396

shell.Router.**hashBased** *(Readonly Property)*

Whether to employ **hashBased** routing.

`Source`

packages/shell/src/router/router.ts:222

shell.Router.**join** *(Method)*

Segment **join**ing helper. The supplied `segment` is converted to a string by spooling to its top-most parent and iterating through all children while concatenating every encountered path. If said path is an (optional) parameter, this portion of the returned string is replaced by the respective Params value.

Signature

```
join(segment): string
```

Returns

The **join**ed Segment in string form.

Parameters

Name	Type	Description
`segment`	`Segment<string>`	The Segment to be **join**ed.

Source

packages/shell/src/router/router.ts:438

shell.Router.**lookup** *(Method)*

Lookup helper method. Calling this method while supplying a `selector` and optionally an array of `routes` to iterate will return the **lookup**ed Route path for the supplied `selector` or `undefined`, if it does not occur within at least one route. When multiple occurrences of the same `selector` exist, the Route path to its first occurrence is returned.

Signature

```
lookup(selector, routes?): undefined | string
```

Returns

The **lookup**ed Route path or `undefined`.

Parameters

Name	Type	Description
`selector`	`string`	The Component `selector` to **lookup**.
`routes`	`Route<string>[]`	An array of `routes` to use for **lookup**.

Source

packages/shell/src/router/router.ts:472

shell.Router.**match** *(Method)*

Main Router **match**ing method. Calling this method while supplying a `path` and optionally an array of `routes` will return the first **match**ing Segment or `undefined`, if nothing **match**es. If no `routes` are supplied, routes previously added to the Router will be used. The **match** method represents the backbone of this Router class, as it, given a list of `routes` and a `path`, will determine whether this path represents a **match** within the list of `routes`, thereby effectively determining navigational integrity.

Example

Test if path `'example/route'` **match**es `child` or `route`:

```
import { Router } from '@sgrud/shell';

const path = 'example/route';
const router = new Router();

const child = {
  path: 'route'
};

const route = {
  path: 'example',
  children: [child]
};
```

```
router.match(path, [child]); // false
router.match(path, [route]); // true
```

Signature

```
match(path, routes?): undefined | Segment<string>
```

Returns

The first **match**ing Segment or `undefined`.

Parameters

Name	Type	Description
`path`	`string`	The `path` to **match** `routes` against.
`routes`	`Route<string>[]`	An array of `routes` to use for **match**ing.

Source

packages/shell/src/router/router.ts:526

shell.Router.**navigate** *(Method)*

Main **navigate** method. Calling this method while supplying either a path or Segment as navigation `target` and optional `search` parameters will normalize the supplied path by trying to match a respective Segment or directly use the supplied Segment for the next State. This upcoming State is looped through all linked Queues and finally handled by the Router itself to render the resulting, possibly intercepted and mutated State.

Throws

An Observable URIError, if nothing matches.

Signature

```
navigate(target, search?, action?): Observable<State<string>>
```

Returns

An Observable of the **navigate**d State.

Parameters

Name	Type	Default value	Description
`target`	`string` | `Segment<string>`	`undefined`	Path or Segment to **navigate** to.
`search?`	`string`	`undefined`	Optional `search` parameters in string form.
`action`	`Action`	`'push'`	The Action to apply to the History.

Source

packages/shell/src/router/router.ts:620

shell.Router.**outlet** *(Readonly Property)*

The rendering **outlet** for navigated Routes.

Source

packages/shell/src/router/router.ts:229

shell.Router.**rebase** *(Method)*

rebase helper method. **rebase**s the supplied `path` against the current baseHref, by either `prefix`ing the baseHref to the supplied `path` or stripping it, depending on the `prefix` argument.

Signature

```
rebase(path, prefix?): string
```

Returns

The `path` **rebase**d against the baseHref.

Parameters

Name	Type	Default value	Description
`path`	`string`	`undefined`	The `path` to **rebase** against the baseHref.
`prefix`	`boolean`	`true`	Whether to `prefix` or strip the baseHref.

Source

packages/shell/src/router/router.ts:679

shell.Router.**spool** *(Method)*

spooling helper method. Given a `segment` (and whether to `rewind`), the top-most parent (or deepest child) of the graph-link Segment is returned.

Signature

```
spool(segment, rewind?): Segment<string>
```

Returns

The **spool**ed Segment.

Parameters

Name	Type	Default value	Description
`segment`	`Segment<string>`	`undefined`	The Segment to **spool**.
`rewind`	`boolean`	`true`	Whether to `rewind` the **spool** direction.

Source

packages/shell/src/router/router.ts:705

shell.Router.**state** *(Accessor)*

Getter mirroring the current value of the internal changes BehaviorSubject.

Signature

```
get state(): State<string>
```

Source

packages/shell/src/router/router.ts:241

shell.Router.**changes** *(Private Readonly Property)*

Internally used BehaviorSubject containing and emitting every navigated State.

Source

packages/shell/src/router/router.ts:235

shell.**Router** *(Namespace)*

Namespace containing types and interfaces used and intended to be used in conjunction with the Singleton Router class.

See

Router

Source

packages/shell/src/router/router.ts:13, packages/shell/src/router/router.ts:165

shell.Router.**Action** *(Type alias)*

Type alias constraining the possible Router **Action**s to `'pop'`, `'push'` and `'replace'`. These **Action**s correspond loosely to possible History events.

Source

packages/shell/src/router/router.ts:20

shell.Router.**Left** *(Type alias)*

String literal helper type. Represents the **Left**est part of a Route path.

Example

Left of `'nested/route/path'`:

```ts
import { type Router } from '@sgrud/shell';

const left: Router.Left<'nested/route/path'>; // 'nested'
```

Type parameters

Name	Type	Description
`S`	extends `string`	The Route path string type.

Source

packages/shell/src/router/router.ts:36

shell.Router.**Params** *(Type alias)*

Type helper representing the (optional) **Params** of a Route path. By extracting string literals starting with a colon (and optionally ending on a question mark), a union type of a key/value pair for each parameter is created.

Example

Extract **Params** from `'item/:id/field/:name?'`:

```ts
import { type Router } from '@sgrud/shell';

const params: Router.Params<'item/:id/field/:name?'>;
// { id: string; name?: string; }
```

Type parameters

Name	Description
S	The Route path string type.

Source

packages/shell/src/router/router.ts:55

shell.Router.**Queue** *(Interface)*

Interface describing the shape of a **Queue**. These **Queue**s are run whenever a navigation is triggered and may intercept and mutate the next State or completely block or redirect a navigation.

See

Queue

Implemented by

Router

Source

packages/shell/src/router/router.ts:72

shell.Router.Queue.**handle** *(Method)*

handle method, called when a navigation was triggered.

Signature

```
handle(next): Observable<State<string>>
```

Returns

An Observable of the **handle**d State.

Parameters

Name	Type	Description
next	State<string>	The next State to be **handle**d.

Source

packages/shell/src/router/router.ts:80

shell.Router.**Segment** *(Interface)*

Interface describing the shape of a Router **Segment**. A **Segment** represents a navigated Route and its corresponding Params. As Routes are represented in a tree-like structure and one **Segment** represents one layer within the Route-tree, each **Segment** may have a parent and/or a child. The resulting graph of **Segment**s represents the navigated path through the underlying Route-tree.

Type parameters

Name	Type	Description
S	extends string = string	The Route path string type.

Source

packages/shell/src/router/router.ts:95

shell.Router.Segment.**child** *(Optional Readonly Property)*

Optional **child** of this Segment.

Source

packages/shell/src/router/router.ts:100

shell.Router.Segment.**params** *(Readonly Property)*

Route path Params and their corresponding values.

Source

packages/shell/src/router/router.ts:105

shell.Router.Segment.**parent** *(Optional Readonly Property)*

Optional **parent** of this Segment.

Source

packages/shell/src/router/router.ts:110

shell.Router.Segment.**route** *(Readonly Property)*

Route associated with this Segment.

Source

packages/shell/src/router/router.ts:115

shell.Router.**State** *(Interface)*

Interface describing the shape of a **State** of the Router. **State**s correspond to the History, as each navigation results in a new **State** being created. Each navigated **State** is represented by its absolute path its search parameters and a segment as entrypoint to the graph-like representation of the navigated path through the route-tree.

Type parameters

Name	Type	Description
`S`	extends `string` = `string`	The Route path string type.

Source

packages/shell/src/router/router.ts:129

shell.Router.State.**path** *(Readonly Property)*

Absolute **path** of the State.

Source

packages/shell/src/router/router.ts:134

shell.Router.State.**search** *(Readonly Property)*

search parameters of the State.

Source

packages/shell/src/router/router.ts:139

shell.Router.State.**segment** *(Readonly Property)*

Segment of the State.

Source

packages/shell/src/router/router.ts:144

shell.**RouterLink** *(Class)*

Custom element extending the HTMLAnchorElement. This element provides a declarative way to invoke the navigate method within the bounds of the RouterOutlet, while maintaining compatibility with SSR/SEO aspects of SPAs. This is achieved by rewriting its href against the baseHref and intercepting the default browser behavior when onclicked.

Example

A `router-link`:

```
<a href="/example" is="router-link">Example</a>
```

See

Router

Hierarchy

- `HTMLAnchorElement`
  - **`RouterLink`**

Source

packages/shell/src/router/link.ts:32

shell.RouterLink.**observedAttributes** *(Static Readonly Property)*

Array of attribute names that should be observed for changes, which will trigger the attributeChangedCallback. This element only observes its href attribute.

Source

packages/shell/src/router/link.ts:39

shell.RouterLink.**attributeChangedCallback** *(Method)*

This method is called whenever this element's href attribute is added, removed or changed. The `next` attribute value is used to determine whether to rebase the href.

Signature

```
attributeChangedCallback(_name, _prev?, next?): void
```

Parameters

Name	Type	Description
`_name`	`string`	The `_name` of the changed attribute (ignored).
`_prev?`	`string`	The `_previous` value of the changed attribute (ignored).
`next?`	`string`	The `next` value of the changed attribute.

Source

packages/shell/src/router/link.ts:75

shell.RouterLink.**constructor** *(Constructor)*

Public **constructor** of this custom RouterLink element. This **constructor** is called whenever a new instance this custom element is being rendered into a Document.

Signature

```
new RouterLink()
```

Source

packages/shell/src/router/link.ts:56

shell.RouterLink.**onclick** *(Readonly Property)*

Type declaration

Overridden **onclick** handler, preventing the default browser behavior and invoking navigate instead.

Signature

```
(event): void
```

Parameters

Name	Type	Description
`event`	`MouseEvent`	The **onclick** fired MouseEvent.

Source

packages/shell/src/router/link.ts:92

shell.RouterLink.**router** *(Private Readonly Property)*

Factored-in **router** property linking the Router.

Decorator

Factor

Source

packages/shell/src/router/link.ts:49

shell.**RouterOutlet** *(Class)*

Custom element extending the HTMLSlotElement. When this element is constructed, it supplies the value of its baseHref attribute and the presence of a hashBased attribute on itself to the Router while connecting the Router to itself. This element should only be used once, as it will be used by the Router as outlet to render the current State.

Example

A `router-outlet`:

```
<slot baseHref="/example" is="router-outlet">Loading...</slot>
```

See

Router

Hierarchy

- `HTMLSlotElement`
  - **`RouterOutlet`**

Source

packages/shell/src/router/outlet.ts:33

shell.RouterOutlet.**baseHref** *(Accessor)*

Getter mirroring the **baseHref** attribute of this element.

Signature

```
get baseHref(): undefined | string
```

Source

packages/shell/src/router/outlet.ts:46

shell.RouterOutlet.**constructor** *(Constructor)*

Public **constructor** of this custom RouterOutlet element. Supplies the value of its baseHref attribute and the presence of a hashBased attribute on itself to the Router while connecting the Router to itself.

Signature

```
new RouterOutlet()
```

Source

packages/shell/src/router/outlet.ts:63

shell.RouterOutlet.**hashBased** *(Accessor)*

Getter mirroring the presence of a **hashBased** attribute on this element.

Signature

```
get hashBased(): boolean
```

Source

packages/shell/src/router/outlet.ts:53

shell.RouterOutlet.**router** *(Private Readonly Property)*

Factored-in **router** property linking the Router.

Decorator

Factor

Source

packages/shell/src/router/outlet.ts:41

shell.**component** *(Const Variable)*

Unique symbol used as property key by the Component decorator to associate the supplied constructor with its wrapper.

Source

packages/shell/src/component/component.ts:9

shell.**createElement** *(Function)*

Element factory. Provides JSX runtime compliant bindings creating arrays of bound elementOpen and elementClose calls. This **createElement** factory function is meant to be implicitly imported by the TypeScript transpiler through its JSX bindings and returns an array of bound elementOpen and elementClose function calls, representing the created Element. This array of bound functions can be rendered into an element attached to the Document through the render function.

See

render

Signature

```
createElement(type, props?, ref?): Element
```

Returns

An array of bound functions representing the Element.

Parameters

Name	Type	Description
`type`	`Function` | keyof `HTMLElementTagNameMap`	The `type` of Element to create.
`props?`	`Record<string, any>`	Any properties to assign to the created Element.
`ref?`	`Key`	An optional `ref`erence to the created Element.

Source

packages/shell/src/component/runtime.ts:116

shell.**createFragment** *(Function)*

JSX fragment factory. Provides a JSX runtime compliant helper creating arrays of bound elementOpen and elementClose calls. This **createFragment** factory function is meant to be implicitly imported by the TypeScript transpiler through its JSX bindings and returns an Element which can be rendered into an element attached to the Document through the render function.

Signature

```
createFragment(props?): Element
```

Returns

An array of bound functions representing the Element.

Parameters

Name	Type	Description
`props?`	`Record<string, any>`	Any properties to assign to the created Element.

Source

packages/shell/src/component/runtime.ts:179

shell.**customElements** *(Const Variable)*

Proxy around the built-in CustomElementRegistry, maintaining a mapping of all registered elements and their corresponding names, which can be queried by calling getName.

Remarks

https://github.com/WICG/webcomponents/issues/566

Source

packages/shell/src/component/registry.ts:13

shell.**html** *(Function)*

Raw **html** rendering helper function. As JSX is pre-processed by the TypeScript transpiler, assigning directly to the `innerHTML` property of an Element will not result in the `innerHTML` to be rendered in the Element. To insert raw **html** into an Element this helper function has to be employed.

Signature

```
html(contents, ref?): Element
```

Returns

An array of bound functions representing the Element.

Parameters

Name	Type	Description
`contents`	`string`	The raw **html** `contents` to render.
`ref?`	`Key`	An optional `reference` to the created Element.

Source

packages/shell/src/component/runtime.ts:205

shell.**references** *(Function)*

JSX **references** helper. Calling this function while supplying a viable `outlet` will return all referenced Elements mapped by their corresponding Keys known to the supplied `outlet`. A viable `outlet` may be any element which previously was passed as `outlet` to the render function.

Signature

```
references(outlet): Map<Key, Node> | undefined
```

Returns

Any **references** known to the supplied `outlet`.

Parameters

Name	Type	Description
`outlet`	`Element` | `DocumentFragment`	The `outlet` to return **references** for.

Source

packages/shell/src/component/runtime.ts:226

shell.**render** *(Function)*

JSX **render**ing helper. This helper is a small wrapper around the patch function and **render**s a Element created through the createElement factory into the supplied `outlet`.

`See`

createElement

`Signature`

```
render(outlet, element): Node
```

`Returns`

Rendered `outlet` element.

`Parameters`

Name	Type	Description
`outlet`	`Element` | `DocumentFragment`	The `outlet` to **render** the `element` into.
`element`	`Element`	JSX `element` to be **render**ed.

`Source`

packages/shell/src/component/runtime.ts:243

shell.**route** *(Const Variable)*

Unique symbol used as property key by the Route decorator to associate the supplied Route configuration with the decorated element.

`Source`

packages/shell/src/router/route.ts:62

state Module

`@sgrud/state` - The SGRUD State Machine.

The functions and classes found within the **`@sgrud/state`** module are intended to ease the implementation of Stateful data Stores within applications built upon the SGRUD client libraries. Through wrappers around the IndexedDB and SQLite3 storage Drivers, data will be persisted in every environment. Furthermore, through the employment of Effects, side-effects like retrieving data from external services or dispatching subsequent Actions can be easily achieved.

The **`@sgrud/state`** module includes a standalone JavaScript bundle which is used to fork a background Thread upon import of this module. This background Thread is henceforth used for State mutation and persistance, independently of the foreground process. Depending on the runtime environment, either a `navigator.serviceWorker` is `registered` or a `new require('worker_threads').Worker()` NodeJS equivalent will be forked.

`Source`

packages/state/index.ts:1

state.**DispatchEffect** *(Class)*

Built-in **DispatchEffect** extending the abstract Effect base class. This **DispatchEffect** is automatically implanted when the `@sgrud/state` module is imported and can therefore be always used in Actions.

`Decorator`

Implant

`See`

Effect

`Hierarchy`

- `Effect`
  - **`DispatchEffect`**

`Source`

packages/state/src/effect/dispatch.ts:68

state.DispatchEffect.**constructor** *(Constructor)*

Public **constructor** (which should never be called).

`Throws`

A TypeError upon construction.

`Signature`

```
new DispatchEffect()
```

`Source`

packages/state/src/effect/effect.ts:71

state.DispatchEffect.**function** *(Method)*

Overridden **function** binding the DispatchEffect to the polymorphic `this` of the StateWorker.

`Signature`

```
function(this): <T>(handle: Handle, …action: Action<T>) => Promise<State<T>>
```

`Returns`

This DispatchEffect bound to the StateWorker.

`Parameters`

Name	Type	Description
`this`	`StateWorker`	The explicit polymorphic `this` parameter.

Source

packages/state/src/effect/dispatch.ts:77

state.**Effect** *(Abstract Class)*

Abstract **Effect** base class. When this class is extended and decorated with the Implant decorator or implanted through the StateHandler, its function will be made available to Actions through the global sgrud.state.effects namespace.

Example

An `importScripts` **Effect**:

```
import { Effect, Implant, type StateWorker, type Store } from '@sgrud/state';

declare global {
  namespace sgrud.state.effects {
    function importScripts(...urls: (string | URL)[]): Promise<void>;
  }
}

@Implant('importScripts')
export class FetchEffect extends Effect {

  public override function(
    this: StateWorker
  ): Store.Effects['importScripts'] {
    return async(...urls) => {
      return importScripts(...urls);
    };
  }

}
```

Type parameters

Name	Type	Description
`K`	extends `Effect` = `Effect`	The Effect `locate` type.

Hierarchy

- **Effect**
  - `DispatchEffect`
  - `FetchEffect`
  - `StateEffect`

Source

packages/state/src/effect/effect.ts:64

state.Effect.**constructor** *(Constructor)*

Public **constructor** (which should never be called).

Throws

A TypeError upon construction.

Signature

```
new Effect<K>()
```

Type parameters

Name	Type
K	extends Effect = Effect

Source

packages/state/src/effect/effect.ts:71

state.Effect.**function** *(Abstract Method)*

Abstract **function** responsible for returning the bound Effect. When an implanted Effect is invoked, it is bound to the polymorphic `this` of the StateWorker upon invocation. This **function** provides the means of interacting with this bond, as in, utilizing the polymorphic `this` of the StateWorker to provide the bound Effect, e.g., by utilizing `protected` properties and methods of the bound-to StateWorker.

Signature

```
function(this): typeof effects[K]
```

Returns

This Effect bound to the StateWorker.

Parameters

Name	Type	Description
this	StateWorker	The explicit polymorphic `this` parameter.

Source

packages/state/src/effect/effect.ts:87

state.**FetchEffect** *(Class)*

Built-in **FetchEffect** extending the abstract Effect base class. This **FetchEffect** is automatically implanted when the `@sgrud/state` module is imported and can therefore be always used in Actions.

Decorator

Implant

See

Effect

Hierarchy

- Effect
  - **FetchEffect**

Source

packages/state/src/effect/fetch.ts:64

state.FetchEffect.**constructor** *(Constructor)*

Public **constructor** (which should never be called).

Throws

A TypeError upon construction.

Signature

```
new FetchEffect()
```

Source

packages/state/src/effect/effect.ts:71

state.FetchEffect.**function** *(Method)*

Overridden **function** binding the FetchEffect to the polymorphic `this` of the StateWorker.

Signature

```
function(this): (requestInfo: URL | RequestInfo, requestInit?: RequestInit) => Promise<Response>
```

Returns

This FetchEffect bound to the StateWorker.

Parameters

Name	Type	Description
`this`	`StateWorker`	The explicit polymorphic `this` parameter.

Source

packages/state/src/effect/fetch.ts:73

state.**Implant** *(Function)*

The **Implant** decorator, when applied to classes extending the abstract Effect base class, implants the decorated class under the `locate` in the global sgrud.state.effects namespace to be used within dispatched Actions.

Example

An `importScripts` **Effect**:

```
import { Effect, Implant, type StateWorker, type Store } from '@sgrud/state';

declare global {
  namespace sgrud.state.effects {
    function importScripts(...urls: (string | URL)[]): Promise<void>;
  }
}

@Implant('importScripts')
export class ImportScriptsEffect extends Effect {

  public override function(
    this: StateWorker
  ): Store.Effects['importScripts'] {
    return async(...urls) => {
      return importScripts(...urls);
    };
  }

}
```

See

StateHandler, Stateful

Signature

```
Implant<T, K>(locate): (constructor: T) => void
```

Returns

A class constructor decorator.

Type parameters

Name	Type	Description
`T`	extends () => `Effect<K>`	An Effect constructor type.
`K`	extends `Effect`	The Effect `locate` type.

Parameters

Name	Type	Description
`locate`	`K`	The `locate` to address the Effect by.

Source

packages/state/src/handler/implant.ts:45

state.**IndexedDB** *(Class)*

IndexedDB Driver. This class provides a facade derived from the built-in Storage interface to IDBDatabases within the browser. This class implementing the Driver contract is used as backing storage by the StateWorker, if run in a browser environment.

See

Driver

Implements

`Driver`

Source

packages/state/src/driver/indexeddb.ts:11

state.IndexedDB.**clear** *(Method)*

Removes all key/value pairs, if there are any.

Signature

```
clear(): Promise<void>
```

Returns

A Promise resolving when this instance was **clear**ed.

Source

packages/state/src/driver/indexeddb.ts:69

state.IndexedDB.**constructor** *(Constructor)*

Public IndexedDB **constructor** consuming the `name` and `version` used to construct this instance of a Driver.

Signature

```
new IndexedDB(name, version)
```

Parameters

Name	Type	Description
`name`	`string`	The `name` to address this instance by.
`version`	`string`	The `version` of this instance.

Source

packages/state/src/driver/indexeddb.ts:38

state.IndexedDB.**getItem** *(Method)*

Returns the current value associated with the given `key`, or null if the given `key` does not exist.

Signature

```
getItem(key): Promise<null | string>
```

Returns

A Promise resolving to the current value or null.

Parameters

Name	Type	Description
`key`	`string`	The `key` to retrieve the current value for.

Source

packages/state/src/driver/indexeddb.ts:86

state.IndexedDB.**key** *(Method)*

Returns the name of the nth key, or null if n is greater than or equal to the number of key/value pairs.

Signature

```
key(index): Promise<null | string>
```

Returns

A Promise resolving to the name of the **key** or null.

Parameters

Name	Type	Description
`index`	`number`	The `index` of the **key** to retrieve.

Source

packages/state/src/driver/indexeddb.ts:103

state.IndexedDB.**length** *(Accessor)*

Returns the number of key/value pairs.

Signature

```
get length(): Promise<number>
```

Source

packages/state/src/driver/indexeddb.ts:21

state.IndexedDB.**name** *(Readonly Property)*

The `name` to address this instance by.

Source

packages/state/src/driver/indexeddb.ts:43

state.IndexedDB.**removeItem** *(Method)*

Removes the key/value pair with the given `key`, if a key/value pair with the given `key` exists.

Signature

```
removeItem(key): Promise<void>
```

Returns

A Promise resolving when the key/value pair was removed.

Parameters

Name	Type	Description
`key`	`string`	The `key` to delete the key/value pair by.

Source

packages/state/src/driver/indexeddb.ts:122

state.IndexedDB.**setItem** *(Method)*

Sets the `value` of the pair identified by `key` to `value`, creating a new key/value pair if none existed for `key` previously.

Signature

```
setItem(key, value): Promise<void>
```

Returns

A Promise resolving when the key/value pair was set.

Parameters

Name	Type	Description
`key`	`string`	The `key` to set the key/value pair by.
`value`	`string`	The `value` to associate with the `key`.

Source

packages/state/src/driver/indexeddb.ts:140

state.IndexedDB.**version** *(Readonly Property)*

The `version` of this instance.

Source

packages/state/src/driver/indexeddb.ts:48

state.IndexedDB.**database** *(Private Readonly Property)*

Private **database** used as backing storage to read/write key/value pairs.

Source

packages/state/src/driver/indexeddb.ts:16

state.**SQLite3** *(Class)*

SQLite3 Driver. This class provides a facade derived from the built-in Storage interface to **SQLite3** databases under NodeJS. This class implementing the Driver contract is used as backing storage by the StateWorker, if run in a NodeJS environment.

See

Driver

Implements

`Driver`

Source

packages/state/src/driver/sqlite3.ts:12

state.SQLite3.**clear** *(Method)*

Removes all key/value pairs, if there are any.

Signature

```
clear(): Promise<void>
```

Returns

A Promise resolving when this instance was **clear**ed.

Source

packages/state/src/driver/sqlite3.ts:76

state.SQLite3.**constructor** *(Constructor)*

Public SQLite3 **constructor** consuming the `name` and `version` used to construct this instance of a Driver.

Signature

```
new SQLite3(name, version)
```

Parameters

Name	Type	Description
`name`	`string`	The `name` to address this instance by.
`version`	`string`	The `version` of this instance.

Source

packages/state/src/driver/sqlite3.ts:39

state.SQLite3.**getItem** *(Method)*

Returns the current value associated with the given `key`, or null if the given `key` does not exist.

Signature

```
getItem(key): Promise<null | string>
```

Returns

A Promise resolving to the current value or null.

Parameters

Name	Type	Description
`key`	`string`	The `key` to retrieve the current value for.

Source

packages/state/src/driver/sqlite3.ts:93

state.SQLite3.**key** *(Method)*

Returns the name of the nth key, or null if n is greater than or equal to the number of key/value pairs.

Signature

```
key(index): Promise<null | string>
```

Returns

A Promise resolving to the name of the **key** or null.

Parameters

Name	Type	Description
`index`	`number`	The `index` of the **key** to retrieve.

Source

packages/state/src/driver/sqlite3.ts:110

state.SQLite3.**length** *(Accessor)*

Returns the number of key/value pairs.

Signature

```
get length(): Promise<number>
```

Source

packages/state/src/driver/sqlite3.ts:22

state.SQLite3.**name** *(Readonly Property)*

The `name` to address this instance by.

Source

packages/state/src/driver/sqlite3.ts:44

state.SQLite3.**removeItem** *(Method)*

Removes the key/value pair with the given `key`, if a key/value pair with the given `key` exists.

Signature

```
removeItem(key): Promise<void>
```

Returns

A Promise resolving when the key/value pair was removed.

Parameters

Name	Type	Description
`key`	`string`	The `key` to delete the key/value pair by.

Source

packages/state/src/driver/sqlite3.ts:127

state.SQLite3.**setItem** *(Method)*

Sets the `value` of the pair identified by `key` to `value`, creating a new key/value pair if none existed for `key` previously.

Signature

```
setItem(key, value): Promise<void>
```

Returns

A Promise resolving when the key/value pair was set.

Parameters

Name	Type	Description
`key`	`string`	The `key` to set the key/value pair by.
`value`	`string`	The `value` to associate with the `key`.

Source

packages/state/src/driver/sqlite3.ts:145

state.SQLite3.**version** *(Readonly Property)*

The `version` of this instance.

Source

packages/state/src/driver/sqlite3.ts:49

state.SQLite3.**database** *(Private Readonly Property)*

Private **database** used as backing storage to read/write key/value pairs.

Source

packages/state/src/driver/sqlite3.ts:17

state.**StateEffect** *(Class)*

Built-in **StateEffect** extending the abstract Effect base class. This **StateEffect** is automatically implanted when the `@sgrud/state` module is imported and can therefore be always used in Actions.

Decorator

Implant

See

Effect

Hierarchy

- `Effect`
  - **StateEffect**

Source

packages/state/src/effect/state.ts:61

state.StateEffect.**constructor** *(Constructor)*

Public **constructor** (which should never be called).

Throws

A TypeError upon construction.

Signature

```
new StateEffect()
```

Source

packages/state/src/effect/effect.ts:71

state.StateEffect.**function** *(Method)*

Overridden **function** binding the StateEffect to the polymorphic `this` of the StateWorker.

Signature

```
function(this): <T>(handle: Handle) => Promise<State<T> | undefined>
```

Returns

This StateEffect bound to the StateWorker.

Parameters

Name	Type	Description
`this`	`StateWorker`	The explicit polymorphic `this` parameter.

Source

packages/state/src/effect/state.ts:70

state.**StateHandler** *(Class)*

The **StateHandler** Singleton class provides the means to interact with an automatically registered ServiceWorker, when instantiated in a browser environment or, when the **StateHandler** is instantiated within a NodeJS environment, a `new require('worker_threads').Worker()` is forked. Within either of these Threads the StateWorker is executed and handles the deployment of Stores and dispatching Actions against them. The same goes for Effects, whose implantation the StateWorker handles.

The functionality provided by the **StateHandler** is best consumed by applying on of the Stateful or Implant decorators, as those provide easier and higher-level interfaces to the functionality provided by this Singleton class.

Decorator

Singleton

See

StateWorker

Source

packages/state/src/handler/handler.ts:30

state.StateHandler.**[observable]** *(Static Method)*

Static `Symbol.observable` method returning a Subscribable. The returned Subscribable mirrors the private loader and is used for initializations after the StateHandler has been successfully initialized.

Example

Subscribe to the StateHandler:

```
import { StateHandler } from '@sgrud/state';
import { from } from 'rxjs';

from(StateHandler).subscribe(console.log);
```

Signature

```
[observable](): Subscribable<StateHandler>
```

Returns

A Subscribable emitting this StateHandler.

Source

packages/state/src/handler/handler.ts:56

state.StateHandler.**loader** *(Static Private Property)*

Private static ReplaySubject used as the StateHandler **loader**. This **loader** emits once after the StateHandler has been successfully initialized.

Source

packages/state/src/handler/handler.ts:37

state.StateHandler.**constructor** *(Constructor)*

Public StateHandler **constructor**. As the StateHandler is a Singleton class, this **constructor** is only invoked the first time it is targeted by the `new` operator. Upon this first invocation, the worker property is assigned an instance of the StateWorker Thread while using the supplied `source`, if any.

Throws

A ReferenceError when the environment is incompatible.

Signature

```
new StateHandler(source?, scope?)
```

Parameters

Name	Type	Description
`source?`	`string`	An optional Module `source`.

`scope?`	`string`	An optionally `scoped` ServiceWorkerRegistration.

`Source`

packages/state/src/handler/handler.ts:95

state.StateHandler.**deploy** *(Method)*

Public **deploy** method which defers the **deploy**ment of the supplied `store` under the supplied `handle` to the StateWorker. For convenience, instead of invoking this **deploy** method manually, the Stateful decorator should be considered.

`Signature`

```
deploy<T>(handle, store, state, transient?): Observable<void>
```

`Returns`

An Observable of the Store **deploy**ment.

`Type parameters`

Name	Type	Description
`T`	extends `Store<any, T>`	The extending Store InstanceType.

`Parameters`

Name	Type	Default value	Description
`handle`	`Handle`	`undefined`	The Handle representing the Store.
`store`	`Type<T>`	`undefined`	The Store to **deploy** under the supplied `handle`.
`state`	`State<T>`	`undefined`	An initial State for the Store.
`transient`	`boolean`	`false`	Whether the Store is considered `transient`.

`Source`

packages/state/src/handler/handler.ts:165

state.StateHandler.**deprecate** *(Method)*

Public **deprecate** method which defers to an invocation of the backing **deprecate** method of the StateWorker to **deprecate** the Store represented by the supplied `handle`.

`Signature`

```
deprecate(handle): Observable<void>
```

`Returns`

An Observable of the Store deprecation.

`Parameters`

Name	Type	Description
`handle`	`Handle`	The Handle representing the Store.

`Source`

packages/state/src/handler/handler.ts:184

state.StateHandler.**dispatch** *(Method)*

Public **dispatch** method which defers the **dispatch**ing of the supplied `action` to the Store represented by the the supplied `handle` to the StateWorker. For convenience, instead of manually invoking this **dispatch** method manually, the Stateful decorator should be considered.

Signature

```
dispatch<T>(handle, ...action): Observable<State<T>>
```

Returns

An Observable of the resulting State.

Type parameters

Name	Type	Description
`T`	extends `Store<any, T>`	The extending Store InstanceType.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle representing the Store.
`...action`	`Action<T>`	A type-guarded Action to **dispatch**.

Source

packages/state/src/handler/handler.ts:202

state.StateHandler.**implant** *(Method)*

Public **implant** method which defers the **implant**ation of the supplied `effect` under the supplied `locate` to the StateWorker. For convenience, instead of invoking this **implant** method manually, the Implant decorator should be considered.

Signature

```
implant<K>(locate, effect): Observable<void>
```

Returns

An Observable of the Store **implant**ation.

Type parameters

Name	Type	Description
`K`	extends `Effect`	The Effect `locate` type.

Parameters

Name	Type	Description
`locate`	`K`	The `locate` to address the Effect by.
`effect`	() => `Effect<K>`	The Effect to **implant** under the `locate`.

Source

packages/state/src/handler/handler.ts:222

state.StateHandler.**invalidate** *(Method)*

Public **invalidate** method which defers to an invocation of the backing **invalidate** method of the StateWorker to **invalidate** the Effect represented by the supplied `locate`.

Signature

```
invalidate<K>(locate): Observable<void>
```

Returns

An Observable of the Effect invalidation.

Type parameters

Name	Type	Description
`K`	extends `Effect`	The Effect `locate` type.

Parameters

Name	Type	Description
`locate`	`K`	The `locate` to address the Effect by.

Source

packages/state/src/handler/handler.ts:240

state.StateHandler.**worker** *(Readonly Property)*

The **worker** Thread is the main background workhorse, depending on the environment, either a `navigator.serviceWorker` is `registered` or a `new require('worker_threads').Worker()` NodeJS equivalent will be forked.

See

StateWorker

Source

packages/state/src/handler/handler.ts:74

state.StateHandler.**kernel** *(Private Readonly Property)*

Factored-in **kernel** property linking the Kernel.

Decorator

Factor

Source

packages/state/src/handler/handler.ts:82

state.StateWorker *(Class)*

The **StateWorker** is a background Thread which is instantiated by the StateHandler to handle the deployment of Stores and dispatching Actions against them. The same goes for Effects, whose implantation the StateWorker handles.

Decorator

Singleton

See

StateHandler

Source

packages/state/src/worker/index.ts:35

state.StateWorker.**activate** *(Static Private Method)*

Private static **activate** method, called when this StateWorker is instantiated as ServiceWorker in a browser environment upon activation of the ServiceWorker.

Signature

```
activate(event): void
```

Parameters

Name	Type	Description
`event`	`ExtendableEvent`	The fired ExtendableEvent.

Source

packages/state/src/worker/index.ts:70

state.StateWorker.**install** *(Static Private Method)*

Private static **install** method, called when this StateWorker is instantiated as ServiceWorker in a browser environment upon installation of the ServiceWorker.

Signature

```
install(event): void
```

Parameters

Name	Type	Description
`event`	`ExtendableEvent`	The fired ExtendableEvent.

Source

packages/state/src/worker/index.ts:81

state.StateWorker.**message** *(Static Private Method)*

Private static **message** method, called when this StateWorker is instantiated as ServiceWorker in a browser environment upon the reception of messages from the controlling Window.

Signature

```
message(event): void
```

Parameters

Name	Type	Description
`event`	`ExtendableMessageEvent`	The fired ExtendableMessageEvent.

Source

packages/state/src/worker/index.ts:92

state.StateWorker.**connect** *(Method)*

Public **connect** method which **connect**s this StateWorker to a BusWorker through the supplied `socket`.

Remarks

This method should only be invoked by the StateHandler.

Signature

```
connect(socket): Promise<void>
```

Returns

A Promise resolving upon `socket` **connect**ion.

Parameters

Name	Type	Description
`socket`	`MessagePort`	A MessagePort to the BusWorker.

Source

packages/state/src/worker/index.ts:180

state.StateWorker.**constructor** *(Constructor)*

Public Singleton StateWorker **constructor**. As this is a Singleton **constructor** it is only invoked the first time this StateWorker class is targeted by the `new` operator. Furthermore this **constructor** returns, depending of the presence of the `source` parameter, a proxyfied instance of this StateWorker class instead of the actual `this` reference.

Remarks

This method should only be invoked by the StateHandler.

Signature

```
new StateWorker(source)
```

Parameters

Name	Type	Description
`source`	`null` | `MessagePort` | `Client` | `ServiceWorker`	The initial ExtendableMessageEvent `source`.

Source

packages/state/src/worker/index.ts:157

state.StateWorker.**deploy** *(Method)*

Public **deploy** method which **deploy**s the supplied `store` under the supplied `handle`. If the Store is **deploy**ed `transiently`, the supplied `state` is used as initial State. Otherwise, if a previously persisted State exists, it takes precedence over the supplied `state`. Furthermore, when the supplied Type is already **deploy**ed and matches the currently **deploy**ed source code, no action is taken. If the `store`'s sources mismatch, a TypeError is thrown.

Throws

A TypeError when the supplied `store` mismatches.

Remarks

This method should only be invoked by the StateHandler.

Signature

```
deploy<T>(handle, store, state, transient?): Promise<void>
```

Returns

A Promise resolving upon Store **deploy**ment.

Type parameters

Name	Type	Description
`T`	extends `Store<any, T>`	The extending Store InstanceType.

Parameters

Name	Type	Default value	Description
`handle`	`Handle`	`undefined`	The Handle representing the Store.
`store`	`Type<T>`	`undefined`	The Store to **deploy** under the supplied `handle`.
`state`	`State<T>`	`undefined`	An initial State for the Store.
`transient`	`boolean`	`false`	Whether the Store is considered `transient`.

Source

packages/state/src/worker/index.ts:204

state.StateWorker.**deprecate** *(Method)*

Public **deprecate** method. When the returned Promise resolves, the deployed Store referenced by the supplied `handle` is guaranteed to be **deprecate**d. Otherwise a ReferenceError is thrown (and therefore the returned Promise rejected).

Throws

A ReferenceError when no Store could be `handle`d.

Remarks

This method should only be invoked by the StateHandler.

Signature

```
deprecate(handle): Promise<void>
```

Returns

A Promise resolving upon Store deprecation.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle representing the Store.

Source

packages/state/src/worker/index.ts:279

state.StateWorker.**dispatch** *(Method)*

Public **dispatch** method. Invoking this method while supplying a `handle` and a appropriate `action` will apply the supplied Action against the Store deployed under the supplied `handle`. The returned Promise resolves to the resulting new State of the Store after the supplied Action was **dispatch**ed against it.

Throws

A ReferenceError when no Store could be `handle`d.

Remarks

This method should only be invoked by the StateHandler.

Signature

```
dispatch<T>(handle, action): Promise<State<T>>
```

Returns

A Promise resolving to the resulting State.

Type parameters

Name	Type	Description
`T`	extends `Store<any, T>`	The extending Store InstanceType.

Parameters

Name	Type	Description
`handle`	`Handle`	The Handle representing the Store.
`action`	`Action<T>`	A type-guarded Action to **dispatch**.

Source

packages/state/src/worker/index.ts:309

state.StateWorker.**implant** *(Method)*

Public **implant** method which **implant**s the supplied `effect` under the supplied `locate` to the global sgrud.state.effects namespace. When the supplied Effect is already **implant**ed and matches the currently **implant**ed source code, no action is taken. If the `effect`'s sources mismatch, a TypeError is thrown.

Throws

A TypeError when the supplied `effect` mismatches.

Remarks

This method should only be invoked by the StateHandler.

Signature

```
implant<K>(locate, effect): Promise<void>
```

Returns

A Promise resolving upon Store **implant**ation.

Type parameters

Name	Type	Description
`K`	extends `Effect`	The Effect `locate` type.

Parameters

Name	Type	Description
`locate`	`K`	The `locate` to address the Effect by.
`effect`	() => `Effect<K>`	The Effect to **implant** under the `locate`.

Source

packages/state/src/worker/index.ts:344

state.StateWorker.**invalidate** *(Method)*

Public **invalidate** method. When the returned Promise resolves, the implanted Effect referenced by the supplied `locale` is guaranteed to be **invalidate**d. Otherwise a ReferenceError is thrown (and therefore the returned Promise rejected).

`Throws`

A ReferenceError when no Effect could be `locate`d.

`Remarks`

This method should only be invoked by the StateHandler.

`Signature`

```
invalidate<K>(locate): Promise<void>
```

`Returns`

A Promise resolving upon Effect invalidation.

`Type parameters`

Name	Type	Description
`K`	extends `Effect`	The Effect `locate` type.

`Parameters`

Name	Type	Description
`locate`	`K`	The `locate` to address the Effect by.

`Source`

packages/state/src/worker/index.ts:370

state.StateWorker.**driver** *(Protected Readonly Property)*

Internal Driver employed as backing data storage. This property contains an instance of either the IndexedDB or the SQLite3 class as abstract facade to either storage provider.

`Source`

packages/state/src/worker/index.ts:105

state.StateWorker.**effects** *(Protected Readonly Property)*

Internal Mapping of Effect locates to their corresponding bound Effects.

`Source`

packages/state/src/worker/index.ts:111

state.StateWorker.**proxies** *(Protected Readonly Property)*

Internal WeakMapping of proxyfied references to this StateWorker to the Effects namespace containing Effects bound to this StateWorker.

`Source`

packages/state/src/worker/index.ts:118

state.StateWorker.**remotes** *(Protected Readonly Property)*

Internal Mapping of Remote BusWorkers to their corresponding proxy of this StateWorker. This Map is used to keep track of the connected Windows and their respective BusWorkers.

Source

packages/state/src/worker/index.ts:126

state.StateWorker.**states** *(Protected Readonly Property)*

Internal Mapping of Handles to WeakMapping of States designated by an object reference. This reference either points to the global self reference, if a Store is deployed to be non-transient or, if the opposite applies, to the proxyfied instance of this StateWorker. Through this distinction stores are associated to either a globally shared reference or to a locally contained and transparent Proxy reference to `this`.

Source

packages/state/src/worker/index.ts:137

state.StateWorker.**stores** *(Protected Readonly Property)*

Internal Mapping of deployed Types to their corresponding Handles.

Source

packages/state/src/worker/index.ts:143

state.StateWorker.**proxy** *(Private Method)*

Private **proxy** method wrapping this StateWorker instance in a Proxy. The resulting Proxy is used to provide distinct `this` references for each of the connected remotes and intercepts dispatch invocations to provide the globally available sgrud.state.effects namespace.

Signature

```
proxy(source): StateWorker
```

Returns

A Proxy wrapping the StateWorker.

Parameters

Name	Type	Description
`source`	`MessagePort` | `Client` | `ServiceWorker`	The initial ExtendableMessageEvent `source`.

Source

packages/state/src/worker/index.ts:386

state.**Stateful** *(Function)*

The **Stateful** decorator, when applied to classes extending the abstract Store base class, converts those extending classes into type-guarding Store facades implementing only the dispatch and the well-known `Symbol.observable` methods. This resulting facade provides convenient access to the current and upcoming States of the decorated Store and its dispatch method. The decorated class is deployed under the supplied `handle` using the supplied `state` as an initial State. If the Store is to be deployed `transient`ly, the supplied `state` is guaranteed to be used as initial State. Otherwise, a previously persisted State takes precedence over the supplied `state`.

Example

A simple `ExampleStore` facade:

```ts
import { Stateful, Store } from '@sgrud/state';

@Stateful('io.github.sgrud.store.example', {
  property: 'default',
  timestamp: Date.now()
})
export class ExampleStore extends Store<ExampleStore> {

  public readonly property!: string;

  public readonly timestamp!: number;

  public async action(property: string): Promise<Store.State<this>> {
    return { ...this, property, timestamp: Date.now() };
  }

}
```

Example

Subscribe to the `ExampleStore` facade:

```ts
import { ExampleStore } from './example-store';

const store = new ExampleStore();
from(store).subscribe(console.log);
// { property: 'default', timestamp: [...] }
```

Example

Dispatch an Action through the `ExampleStore` facade:

```ts
import { ExampleStore } from './example-store';

const store = new ExampleStore();
store.dispatch('action', ['value']).subscribe(console.log);
// { property: 'value', timestamp: [...] }
```

See

StateHandler, Implant

Signature

```
Stateful<T, I>(handle, state, transient?): (constructor: T) => T
```

Returns

A class constructor decorator.

Type parameters

Name	Type	Description
`T`	extends `Type<I, T>`	A constructor type extending the Type.
`I`	extends `Store<any, I> = InstanceType<T>`	The extending Store InstanceType.

Parameters

Name	Type	Default value	Description
`handle`	`Handle`	`undefined`	The Handle representing the Store.
`state`	`State<I>`	`undefined`	An initial State for the Store.
`transient`	`boolean`	`false`	Whether the Store is considered `transient`.

Source

packages/state/src/handler/stateful.ts:71

state.**Store** *(Abstract Class)*

Abstract **Store** base class. By extending this **Store** base class and decorating the extending class with the Stateful decorator, the resulting **Store** will become a functional facade implementing only the dispatch and well-known `Symbol.observable` methods. This resulting facade provides convenient access to the current and upcoming States of the **Store** and its dispatch method, while, behind the facade, interactions with the BusHandler to provide an Observable of the State changes and the StateHandler to dispatch any Actions will be handled transparently.

The same functionality can be achieved by manually supplying a **Store** to the StateHandler and subscribing to the changes of that **Store** through the BusHandler while any Actions also have to be passed manually to the StateHandler. But the Stateful decorator should be preferred out of convenience and because invoking the constructor of the **Store** class throws a TypeError.

`Example`

A simple `ExampleStore` facade:

```
import { Stateful, Store } from '@sgrud/state';

@Stateful('io.github.sgrud.store.example', {
  property: 'default',
  timestamp: Date.now()
})
export class ExampleStore extends Store<ExampleStore> {

  public readonly property!: string;

  public readonly timestamp!: number;

  public async action(property: string): Promise<Store.State<this>> {
    return { ...this, property, timestamp: Date.now() };
  }

}
```

`Example`

Subscribe to the `ExampleStore` facade:

```
import { ExampleStore } from './example-store';

const store = new ExampleStore();
from(store).subscribe(console.log);
// { property: 'default', timestamp: [...] }
```

`Example`

Dispatch an Action through the `ExampleStore` facade:

```
import { ExampleStore } from './example-store';

const store = new ExampleStore();
store.dispatch('action', ['value']).subscribe(console.log);
// { property: 'value', timestamp: [...] }
```

`Type parameters`

Name	Type	Description
`T`	extends `Store` = `any`	The extending Store InstanceType.

`Source`

packages/state/src/store/store.ts:12, packages/state/src/store/store.ts:164

state.Store.**[observable]** *(Property)*

`Type declaration`

Well-known `Symbol.observable` method returning a Subscribable. The returned Subscribable emits all States this Store traverses, i.e., all States that result from dispatching Actions on this Store.

Throws

An ReferenceError when not called Stateful.

Example

Subscribe to the `ExampleStore`:

```
import { ExampleStore } from './example-store';

const store = new ExampleStore();
from(store).subscribe(console.log);
```

Signature

```
(): Subscribable<State<T>>
```

Returns

A Subscribable emitting State changes.

Source

packages/state/src/store/store.ts:184

state.Store.**constructor** *(Constructor)*

Throws

A TypeError upon construction.

Signature

```
new Store<T>()
```

Type parameters

Name	Type
`T`	extends `Store<any, T> = any`

Source

packages/state/src/store/store.ts:189

state.Store.**dispatch** *(Method)*

The **dispatch** method provides a facade to **dispatch** an Action through the StateHandler when this Store was decorated with the Stateful decorator, otherwise calling this method will throw an ReferenceError.

Throws

An ReferenceError when not called Stateful.

Example

Dispatch an Action to the `ExampleStore`:

```
import { ExampleStore } from './example-store';

const store = new ExampleStore();
store.dispatch('action', ['value']).subscribe();
```

Signature

```
dispatch(...action): Observable<State<T>>
```

Returns

An Observable of the resulting State.

Parameters

Name	Type	Description
`...action`	`Action<T>`	A type-guarded Action to **dispatch**.

`Source`

packages/state/src/store/store.ts:212

state.**Store** *(Namespace)*

The **Store** namespace contains types and interfaces used and intended to be used in conjunction with the abstract Store class.

`See`

Store

`Source`

packages/state/src/store/store.ts:12, packages/state/src/store/store.ts:164

state.Store.**Action** *(Type alias)*

This Store **Action** helper type represents the signatures of all available **Action**s of any given Store by extracting all methods from the given Store that return a promisified State of that given Store. This State is interpreted as the next State after this **Action** was invoked.

`Type parameters`

Name	Type	Description
`T`	extends `Store`	The extending Store InstanceType.

`Source`

packages/state/src/store/store.ts:24

state.Store.**Driver** *(Type alias)*

The **Driver** helper type is a promisified variant of the built-in Storage type. This type is utilized by the StateWorker where it represents one of the available Storage **Driver**s.

`Implemented by`

`IndexedDB`, `SQLite3`

`Source`

packages/state/src/store/store.ts:40

state.Store.**Effect** *(Type alias)*

The **Effect** helper type represents a `keyof` the Effects map.

`Source`

packages/state/src/store/store.ts:50

state.Store.**Effects** *(Type alias)*

The **Effects** helper type represents the `typeof` the globally available sgrud.state.effects namespace.

Source

packages/state/src/store/store.ts:56

state.Store.**State** *(Type alias)*

The Store **State** helper type represents the current **State** of any given Store by extracting all properties (and dropping any methods) from that given Store.

Type parameters

Name	Type	Description
`T`	extends `Store`	The extending Store InstanceType.

Source

packages/state/src/store/store.ts:65

state.Store.**States** *(Type alias)*

The **States** helper type represents the traversal of Stores.

Source

packages/state/src/store/store.ts:77

state.Store.**Type** *(Interface)*

Interface describing the **Type**, i.e., static constructable context, of classes extending the abstract Store base class.

Type parameters

Name	Type	Description
`T`	extends `Store`	The extending Store InstanceType.

Hierarchy

- `Required`<typeof `Store`>
  - **Type**

Source

packages/state/src/store/store.ts:85

state.Store.Type.**constructor** *(Constructor)*

Overridden and concretized constructor signature.

Signature

```
new Type()
```

Source

packages/state/src/store/store.ts:85

state.Store.Type.**prototype** *(Readonly Property)*

Overridden `prototype` signature.

`Source`

packages/state/src/store/store.ts:90

Test Coverage

File	% Stmts	% Branch	% Funcs	% Lines	Uncovered Line #s
All files	99.97	96.11	99.63	99.97	
bus/src/bus	99.77	97.61	100	99.77	
bus.ts	99.61	92.85	100	99.61	1
querier.ts	100	100	100	100	
transfer.ts	100	100	100	100	
bus/src/handler	100	97.56	100	100	
handler.ts	100	95.65	100	100	133
observe.ts	100	100	100	100	
publish.ts	100	100	100	100	
stream.ts	100	100	100	100	
core/src/http	100	100	100	100	
http.ts	100	100	100	100	
proxy.ts	100	100	100	100	
transit.ts	100	100	100	100	
core/src/kernel	100	98.05	100	100	
kernel.ts	100	97.14	100	100	345,376
semver.ts	100	100	100	100	
core/src/linker	100	94.44	100	100	
factor.ts	100	100	100	100	
linker.ts	100	90	100	100	35
target.ts	100	100	100	100	
core/src/super	100	94.73	100	100	
provide.ts	100	100	100	100	
provider.ts	100	100	100	100	
registry.ts	100	93.75	100	100	95
core/src/thread	100	95.83	100	100	
spawn.ts	100	93.33	100	100	75
thread.ts	100	100	100	100	
transfer.ts	100	100	100	100	
core/src/utility	100	92.15	95.83	100	
assign.ts	100	100	100	100	
pluralize.ts	100	100	100	100	
singleton.ts	100	78.94	80	100	27,49
symbols.ts	100	100	100	100	
type-of.ts	100	100	100	100	
data/src/model	100	99.15	100	100	
enum.ts	100	83.33	100	100	10
model.ts	100	100	100	100	
data/src/querier	100	100	100	100	
http.ts	100	100	100	100	
querier.ts	100	100	100	100	
data/src/relation	100	100	100	100	
has-many.ts	100	100	100	100	
has-one.ts	100	100	100	100	
property.ts	100	100	100	100	
shell/src/component	99.88	97.45	100	99.88	
attribute.ts	98.73	87.5	100	98.73	64
component.ts	100	96.29	100	100	177
fluctuate.ts	100	100	100	100	
reference.ts	100	100	100	100	
registry.ts	100	100	100	100	
runtime.ts	100	100	100	100	
shell/src/jsx-runtime	100	100	100	100	
index.ts	100	100	100	100	
shell/src/queue	100	94.04	100	100	
catch.ts	100	92.72	100	100	86,195,201,228
queue.ts	100	100	100	100	
resolve.ts	100	96.42	100	100	96
shell/src/router	100	95.31	100	100	
link.ts	100	85.71	100	100	57
outlet.ts	100	85.71	100	100	64
route.ts	100	100	100	100	
router.ts	100	95.95	100	100	252,398,483,664
state/src/driver	100	98.55	100	100	
indexeddb.ts	100	97.61	100	100	11
sqlite3.ts	100	100	100	100	
state/src/effect	100	78.12	100	100	
dispatch.ts	100	83.33	100	100	68
effect.ts	100	100	100	100	

File	% Stmts	% Branch	% Funcs	% Lines	Uncovered Line #s
fetch.ts	100	83.33	100	100	64
state.ts	100	63.63	100	100	61,73-76
transfer.ts	100	87.5	100	100	14
state/src/handler	100	92.45	100	100	
handler.ts	100	90	100	100	110,115,122,149
implant.ts	100	100	100	100	
stateful.ts	100	100	100	100	
state/src/store	100	92.3	100	100	
store.ts	100	100	100	100	
transfer.ts	100	90	100	100	13

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